



Anchorage Forestland Assessment and Management Plan

September 2010



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Executive Summary

Anchorage forestlands are the foundation for the health, sustainability, and economic well-being of Anchorage communities. These forests are an essential, living, and dynamic resource that provides critical support and ecosystem services to both people and wildlife, contributing greatly to the quality of life, environmental and socio-economic health, and the identity of Anchorage. The preservation and protection of significant forestlands is vital to the realization of many of the environmental and sustainability goals established by the *Anchorage 2020* comprehensive plan.

The forestland assessment, completed in July 2010 included mapping the extent and location of existing tree canopy, analysis of canopy cover relative to land use, and an estimation of species composition. The assessment considered the value and benefits of these forestlands to both people and wildlife, and identified threats to forest health and sustainability. Inventory samples from two different forest types provide a quantified estimation of the environmental benefits received annually from these forest types. Public outreach and an online survey provided an opportunity for residents, user groups, community leaders, and environmental managers to express their views and ideas on the value and benefits of Anchorage's forestlands and the strategies for the conservation, protection, and management of this resource. The resulting data provides the foundation for the goals and objectives outlined in the forestland management plan as well as a benchmark for determining the future success of management strategies and Anchorage's ongoing commitment to smart growth. Highlights of this assessment include the following information:

- The Municipality has an average 59% canopy cover overall, the majority of which (75%) is in parks, greenbelts, and open space, including state parks and national forests. The bowl has an average 35% canopy cover; 68% in parks and open space and 29% in other areas.
- One acre of mixed conifer/deciduous forest provides \$6,314 in annual environmental benefits and has a replacement value of \$684,385. One acre of paper birch/deciduous forest provides \$3,673 in annual environmental benefits, and has a replacement value of \$637,362.
- Threats to Anchorage forestlands include development, increased use, wildfire, climate change, pests, and disease; the primary of these is development. Since Alaska became a state in 1959, the population has increased by 234% and is expected to increase an additional 32% by 2020. The bowl has already lost 50% of its forestland cover and the current 35% overall canopy is less than the recommended goal of 40% (American Forests).

The overarching intent of the Anchorage Forestland Management Plan is to:

Preserve and enhance Anchorage's natural and developed forest and the benefits they provide that are critical to the quality of life of residents, visitors, and wildlife.

The plan recognizes that continued growth and development is both desirable and necessary to the economic well being of the community. However, neglecting to provide adequate consideration to the preservation of trees and forests can be a costly oversight. Communities around the world are finding the need to reestablish urban forests *after* significant loss of canopy takes a toll on quality of life. Anchorage has the enviable opportunity to avoid costly reforestation if current deforestation trends are modified and if significant forest stands are preserved. Recognizing the vital function of trees and forests and adopting proactive preservation strategies is much more cost-effective than trying to rebuild a healthy, working urban forest.

Introduction

The Municipality of Anchorage covers 1,955 square miles and includes the urban communities of Anchorage, Eagle River, and Girdwood. More than 270,000 people live within the municipal boundaries—nearly half the population of Alaska. Trees and natural forestlands play a huge role in the quality of life in Anchorage and throughout all of Alaska. Forestlands are essential to the health and sustainability of the community, protecting vital water resources and salmon spawning grounds, improving air quality, increasing property values, and providing critical habitat for wildlife. The forestlands in Anchorage are home to 52 species of mammals, five species of salmon, and 230 bird species.

Anchorage forestlands provide many recreational opportunities. Within the municipal boundaries, there are more than 1,131 square miles of public parks and forestlands including much of Chugach State Park, areas of Chugach National Forest, and municipal parks. In addition, there are nearly 750 miles of trails and greenbelts and an estimated 30,000 street trees.

Because of its prime location and population, Anchorage is a major commercial and transportation hub. Home to Ted Stevens Anchorage International Airport (serving commercial and small private planes and providing access to all areas of the state including high value wildlands, refuges, and parks), the Port of Anchorage, as the state's largest seaport, handles 90% of consumer goods in Alaska (city-data.com) and is a major railroad terminal. Most consumer goods that enter or leave Alaska pass through Anchorage. The USDA Forest Service has identified threats to our nation's forests, including wildfire, invasive plant and animal species, unregulated recreation, and loss of open space (USDA). Each of these threats is primary to Anchorage, especially the risk of exotic and invasive species, which pose an especially high level of threat to Alaska's pristine ecosystems. As the primary hub for commerce into the state, there is increased likelihood of the introduction of exotic pests into Anchorage, which could spread quickly to remote areas in all other parts of Alaska.

It's easy to believe that the abundant forests and the benefits they provide are eternal and self-sustaining. However, the truth is that an ever-expanding population and development have placed stress on this natural resource, threatening the future quality of life of residents and visitors. Since Alaska became a state in 1959, the population of Anchorage has increased more than 230%. As more and more forests are cleared for development, Anchorage becomes a less healthy environment for humans and wildlife, including salmon, which depend upon forest cover for shade, food, and water quality.

Recognizing the importance of forestlands to the quality of life in Anchorage and all of Alaska, the State of Alaska Division of Forestry, Community Forestry Program, contracted with Davey Resource Group in February 2010 to undertake an assessment of forest resources within the Municipality of Anchorage (MOA) and develop a management plan for preserving and maximizing the benefits supplied by this valuable natural resource. This project is the final phase of a three-phase project—Anchorage Inventory and Management Plan: Maximizing Forest Benefits for Alaskans. Phase 1, which began in August 2008, was an inventory of public street and facility trees. The data collected in that inventory was integrated into the municipal GIS (Geographic Information System) database. The development of an Urban Forestry Management Plan for public street and facility trees was accomplished in Phase 2. Together, these projects are the foundation of a successful urban forestry program, established to protect and conserve forest resources in Anchorage as well as those on surrounding state and federal lands.

Acknowledged as a Tree City USA in 2006 by the Arbor Day Foundation, Anchorage has invested millions of dollars in public trees and taken steps necessary to develop a comprehensive urban forestry program, including hiring the first municipal forester in the state of Alaska. The stunning natural beauty that surrounds and defines Anchorage living is unique and unsurpassed in communities of similar size and amenities. Committed to preserving and enhancing the unique quality of life and the natural beauty of the surrounding environment, the community has taken an active role in future development and conservation by defining specific goals and strategies in *Anchorage 2020: Anchorage Bowl Comprehensive Plan*. Healthy and sustainable forestlands are vital to realizing many of the goals set forth in the plan, including clean air; preservation of water resources, wetlands, and wildlife; maintaining harmony with nature; and a sustainable community that promotes health and well-being. In addition, the Anchorage Bowl Park, Natural Resource, and Recreation Facility Plan (2006) identifies the development of natural resource management plans as a short-term, high priority action item.

Successful management of any resource requires a thorough understanding of the current status of the resource, including extent, location, condition, and value. Only when a resource has been quantified and defined can significant, measurable management take place; therefore, the initial goal of this project was an assessment of the current forest resource including:

- The extent and location of tree canopy cover within the municipal boundary.
- Species composition.
- Canopy coverage relative to land use.
- Estimation of environmental benefits per acre for two forest types (paper birch/deciduous and mixed forest).
- Defining the value and benefits of Anchorage's forestlands to people and wildlife.
- Identification of threats to forest health and sustainability.
- An account of current management policies, activities, and budgets.

The assessment considered all canopy cover within the municipal boundary, including trees in developed and natural forested areas. The resulting information provides a foundation for the development of long-term management goals and allows managers and citizens to make informed decisions about budgetary and policy support and management priorities. The analysis also establishes a benchmark for measuring the success of future management strategies (results of the analysis are detailed in Chapter 2).

Upon completion of the forest resource analysis, DRG consultants met with MOA and state forestry professionals to develop a forestland management plan. The information gained from the forest assessment and canopy analysis were considered in the development of goals and objectives outlined in the plan and intended to allow Anchorage to protect and conserve its forestland resources and the ecosystem benefits provided by this critical community asset.

The forestland assessment and the management plan may be used by the Municipality to develop detailed management plans for communities, open space and recreational areas, individual parks, and planning zones.

The overarching intent of the Anchorage Forestland Management Plan is to:

Preserve and enhance Anchorage's natural and developed forests and the benefits they provide that are critical to the quality of life of residents, visitors, and wildlife.

In support of this intention, the plan identifies the following primary goals:

- ❖ ***Conserve the current level of overall tree canopy cover at no net loss and maximize the flow of benefits.***
- ❖ ***Support smart growth¹ and development while preserving the quality of life in Anchorage.***
- ❖ ***Preserve recreational opportunities through responsible vegetation management along trails and other high-use areas.***
- ❖ ***Develop a sustainable, cost-efficient forest management program.***

The plan is specific to public lands within the boundaries of the Municipality of Anchorage and has no authority or jurisdiction over private lands. Details of the management plan can be found in Chapter 4, including the specific objectives recommended for accomplishing these goals.

Smart growth: a development philosophy based on some or all of these principles: a range of housing opportunities and choices; walkable neighborhoods; community and stakeholder collaboration; distinctive, attractive communities with a strong sense of place; development decisions that are predictable, fair, and cost effective; a mix of land uses; preservation of open space, farmland, natural beauty, and critical environmental areas; a variety of transportation choices; development strengthened and directed towards existing communities; and taking advantage of compact building designs. (smartgrowth.org)

Chapter 1: Anchorage: History, Development, and Forestlands

History and Development

The Anchorage area was originally settled by the Tanaina more than 6,000 years ago as a summer fishing camp. By 1700, the location was already a major trading center for Native Americans, Eskimos, and Aleuts (city-data.com). Captain James Cook explored the area on his third voyage of discovery (1778), claiming the land for England, and later becoming the namesake for Cook Inlet which today borders Anchorage to the west and northwest. During the 1800s, Russian migrants had settled into the area, stirring additional flavors into the cultural mix, and influencing customs, art, and architecture in ways still in evidence today. In 1867, Russia sold the area along with all of Alaska to the United States of America for just over \$7 million. When gold was discovered along Turnagain Arm in 1882, leagues of prospectors seeking their fortunes burst upon the scene, resulting in a population explosion that included service and retail establishments in support of the rapidly growing community.

Anchorage was established in 1915 at the mouth of Ship Creek, where a tent city was erected, housing workers and materials, and serving as headquarters for the construction of the government-owned Alaska Railroad line from Seward to Fairbanks (anchorage.net). Already a major city, Anchorage was incorporated November 23, 1920. The rail line was completed in 1923 and the first airfield was constructed. With few connecting roads in Alaska even today, air transportation was and remains critical to commerce. Anchorage established its own airline in 1926 and Merrill Field, a commercial service airport, was opened in 1935 (city-data.com).

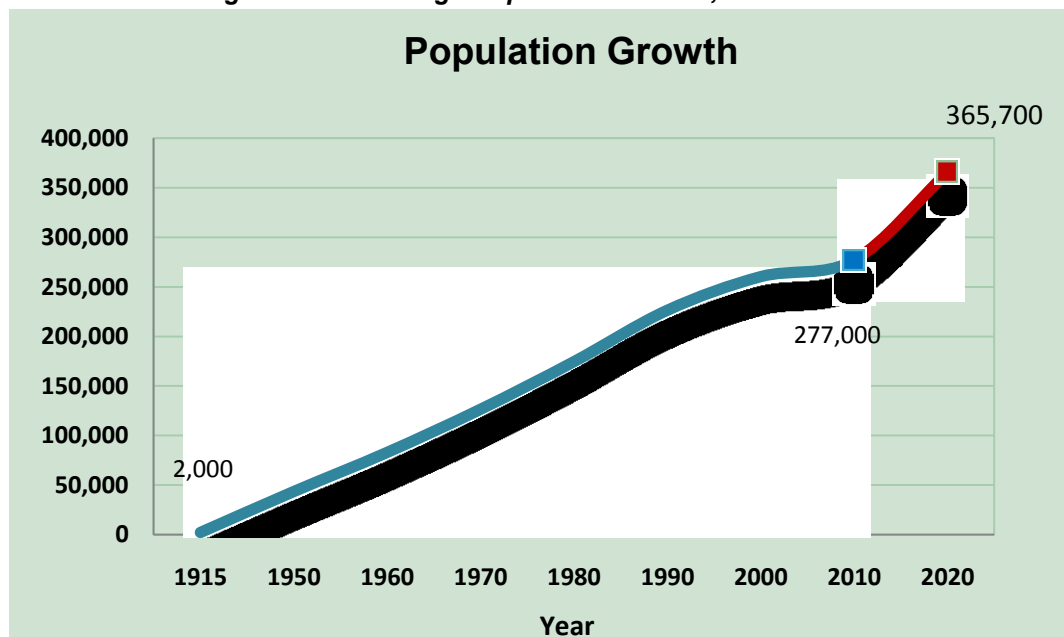
In the 1930s, Anchorage experienced an influx of dust bowl farmers from the Midwest along with the initial buildup of the military defense complex. The buildup included the construction of Fort Richardson and Elmendorf Field Air Force Base. The military remains an important part of Anchorage economy to this day. In 1942, the Alaska Highway was completed, becoming a military supply line to northern defense headquarters and a link to other parts of the country (city-data.com). By 1950, Anchorage had reached a population of 43,314. An international airport was opened in 1951, quickly becoming a primary connection to transpolar air traffic between America, Europe, and Asia. On January 3, 1959, Alaska became the 49th state of the United States of America.

What would become another important industry, commercial oil, was discovered in the Cook Inlet basin in the late 1950s. Then, disaster struck with the devastating Good Friday earthquake of March 27, 1964. The earthquake, registering 9.2 on the Richter scale, was centered 80 miles south of Anchorage, caused hundreds of millions in damages, and took more than two years to recover from.

In 1975, city and borough governments merged to become the Municipality of Anchorage and, by 1980, the population had swelled to more than 174,000 people. An influx of North Slope oil revenues into the state treasury supported growth in the 1980s, spawning capital projects, beautification efforts, and long-range community planning. And though a collapse in world crude oil prices resulted in a statewide recession and a population decrease in 1986, Anchorage had further swelled to a population of more than 226,000 residents by 1990. The 1990s saw record economic growth and established Alaska as a tourist destination.

Today, Anchorage is Alaska's largest city with a population of 277,000 residents, 42 percent of the entire state population (anchorage.net). With an international airport, a deepwater port, a major rail terminal, and the Alaska Highway, Anchorage is the primary commercial hub of distribution to other communities in the state. Oil, gas, military, transportation, and tourism are the primary industries. Elmendorf-Richardson, a joint Air Force and Army base is located in Anchorage, along with the University of Alaska and Alaska Pacific University. Anchorage residents enjoy a relatively high per capita income and low taxes. The community takes pride in a thriving culture, with museums, galleries, an opera, symphony orchestra, and the influence and traditions of five unique Alaska Native cultures and the various immigrant groups who have settled in the area. With a favorable business climate and a commitment to education, it's no surprise that the community has been honored four times as an All American City (most recently in 2002) by the National Civic League. Based on forecasts published by the University of Alaska Anchorage's Institute of Social and Economic Research (ISER), the Anchorage 2020: Anchorage Bowl Comprehensive Plan estimates the municipal population will increase to 365,700 (base case) by the year 2020 (Figure 1).

Figure 1. Anchorage Population Growth, 1915 to 2010



(Source: anchorage.net, city-data.com, and censusscope.org) and estimated (base case) population by 2020 (Anchorage 2020).

Climate and Geography

The Municipality of Anchorage is located in a wide valley at the base of the Chugach Mountains on the coast of Cook Inlet in south-central Alaska. Stretching from Portage Glacier in the south to Eklutna in the north and eastward into the Chugach National Forest, the Municipality encompasses an area of approximately 1,955 square miles. Enjoying a maritime climate and relatively low precipitation (70 inches of snowfall and 15 plus inches of rainfall annually [city-data.com]), Anchorage experiences four seasons with temperatures averaging 20° F in the winter and 65° F in the summer. Daylight ranges from a minimum of about six hours on the winter solstice to a maximum of around 19 hours on the summer solstice.

Forest Use and Value

Regardless of the season, outdoor recreation is an important part of life for residents and visitors. During the long days of summer, fishing, boating, kayaking, and cycling or hiking on more than 120 miles of paved trails and over 600 miles of unpaved and wilderness trails are just a few of the activities available. In winter months, ice and snow add new opportunities for fun when enthusiasts enjoy ice skating, downhill skiing, sledding, snow machining, snow shoeing, and cross-country skiing and skijoring on 200 miles of maintained trails. Winter is also the time for engaging in the official state sport—dog sledding. Dog sled teams train on their own dedicated trail system and downtown Anchorage is the ceremonial starting point for the Iditarod Trail Sled Dog Race and the official starting point for the World Championship Sled Dog Races, a highlight of the Fur Rendezvous Festival since 1936. Alaska is the last frontier, and Anchorage is no exception.

Wildlife is a natural part of living in this adventuresome community. Black and brown bears, wolves, Dall sheep, beaver, and a large population of moose are just a few of the 52 mammals that live within the municipal boundaries. Besides mammals, Anchorage is home to five salmon species and 230 bird species. Marine mammals, including beluga whale, are present in Cook Inlet. While living in close proximity to all this wildlife does pose a few nuisance challenges and even some danger, a recent poll conducted by the Alaska Department of Fish and Game (2010) found that most residents take pride in the wildlife and believe “they make life in Anchorage more interesting and special.” Viewing and photographing wildlife is also high on the list of attractions for visitors.

The stunning beauty and natural wilderness that surrounds and defines Anchorage living is unique and unsurpassed. Forests are an integral part of that beauty. Trees and forests are the foundation of the production food chain, providing vital ecosystem services and supporting the quality of life of humans and wildlife. Forestlands are essential to the health and sustainability of the environment and the Anchorage community. They protect vital water resources and salmon spawning grounds, improve air quality, increase property values, provide critical habitat for wildlife, and provide unlimited opportunities for recreation.

Anchorage has consistently demonstrated an appreciation for both wilderness and wildlife, dedicating nearly 14,000 acres to municipal parks and greenbelts as well as developing over 250 miles of maintained trails and planting an estimated 30,000 street trees. Chugach State Park is located within the municipal boundary in the Chugach Mountains, east of Anchorage. The park, established in 1970, is the third largest state park in the US and is listed as one of the top ten state parks (America’s Best). In addition, to the east, nearly 384 square miles of Chugach National Forest lands lie within municipal boundaries.



Residents take pride in wildlife like this brown bear and believe living with wildlife makes Anchorage more interesting and special.

Recognizing the function of wildland and forests, the community has taken an active role in future development and conservation, defining specific goals and strategies in *Anchorage 2020: Anchorage Bowl Comprehensive Plan* and making a commitment to sustainability. However, without a clear understanding of how previous development has impacted Anchorage forests, it's difficult to determine exactly what future strategies are necessary and justified for preserving what exists today.



Figure 2. Aerial photograph of Anchorage Bowl dated August 1950.
(Photo courtesy of Aeromap US.)

Since Alaska became a state in 1959, the Anchorage population has increased by 234% to 277,000 and is expected to increase another 32% (365,700) by 2020 (Figure 1). An aerial photo taken August 8, 1950 (Figure 2) clearly shows forests and wetlands that existed at the time. By 1974, less than 25 years later, much of the forestland in the Anchorage Bowl had been developed or cleared for development (Figure 3).

Figure 4 illustrates the progression of development through September 2002 when the photo was taken. While it may not be possible to quantify the actual amount of wetlands and forest acres lost to development, it's easy to see how quickly that loss can occur. To date, more than half of the original wetlands have been lost to development. Current tree canopy cover in the Anchorage bowl area is 35%. Nearly one third of that is in parks and greenbelts.



**Figure 3. Aerial photograph of Anchorage Bowl dated May 1974.
(Photo courtesy of Aeromap US)**

Considering that the current tree canopy cover in Anchorage bowl municipal parks averages 68% and nearby Chugach State Park has an average tree canopy cover of 76%, it is reasonable to assume that prior to development the bowl had at minimum an average tree canopy cover of 65%. If this assumption is true, then nearly 34 square miles (21,713 acres) of forests have already been lost within the bowl. Since development and continued growth are both desirable

and necessary for the socioeconomic well-being and sustainability of Anchorage, the loss of existing wetlands and wildlife corridors will likely remain an ongoing concern.

Development isn't the only threat to forestlands. The potential for the introduction of invasive or exotic insect and plant species in addition to climate change, bark beetles, wildfire, and an increase in unregulated use are other issues which threaten the health and sustainability of Anchorage's forests.



**Figure 4. Aerial photograph of Anchorage Bowl dated September 2004.
(Photo courtesy of Aeromap US).**

The USDA Forest Service has identified invasive plant and animal species as a threat to all Alaska forestlands. Exotic pests and pathogens can be introduced through nursery stock, shipping containers, wood packing materials, lumber, pallets, firewood, and other similar avenues. As a primary transportation hub for transpolar air traffic and commercial goods entering Alaska, the threat of exotic pest introduction into Anchorage is high. Between Ted Stevens Anchorage International Airport, Merrill Field, Lake Hood Seaplane Base, the Port of Anchorage, a major railroad terminal, and the Alaska Highway, many goods entering Alaska and destined for other areas of the state pass through Anchorage. A pest introduced into Anchorage would not only threaten local forestlands, but could also quickly spread to other more remote areas of the state, including high value wildlands, refuges, and parks. Exotic and invasive species like gypsy moth (*Lymantria dispar*) pose an especially high level of threat to Alaska's pristine ecosystems. As evidenced in other parts of the country, the introduction of exotic species like Asian Longhorned beetle (ALB) and emerald ash borer (EAB) can be devastating and costly.

Since 1949, the average annual temperature in Anchorage has increased by 3° F. Winter temperatures have increased by 5.8° F (ACRC). In September 2007, the Alaska Climate Change Sub-cabinet was formed to serve in an advisory capacity to the Office of the Governor on climate change strategy. Along with melting glaciers, rising sea levels, and increased storm activity, the Governor's office predicts increased frequency and intensity of spruce bark beetle activity and forest fires in Alaska (Alaska.gov). Recent studies seem to demonstrate that climatic warming trends have caused decreased growth in some populations of white spruce in Alaska (Barber et al., 2000; Chapin et al., 2006). Because trees are long-lived, climatic shifts, including above normal temperatures and below normal precipitation, have a greater impact and long-term effects on forest health. Stress and decreased growth response predispose forests to attack from spruce beetle as well as other pests and disease causing organisms, inhibiting immune and attack response and amplifying injury and mortality rates.

Spruce beetles have been an ongoing issue in Anchorage forests since 1970, causing significant mortality in both white and Lutz spruce. Excessive breeding material, including dead and dying spruce and slash, along with favorable weather conditions support the continued success of this pest population (USDA, 2009).

While Anchorage has not experienced a large wildland fire since 1973, there have been several significant fires in the past number of years, including the 50-acre Otter Lake Fire in 2006 (CWPP). Wildfire is part of the natural cycle and all forests are at risk. However, the current risk of wildfire in Anchorage is high as a result of the large number of dead trees killed by spruce beetles. This type of fuel not only increases the risk of fire, but also the burn intensity and hinders the ability to conduct fire suppression in the event of a wildfire. Wildfires that threaten homes, property, and life are a serious issue.

An ever-expanding population has a greater impact on natural forestlands, where increased use (including hiking, biking, and camping) and unregulated use (including the harvesting of forest products such as fuel wood, mushrooms, and birch bark) result in an increased threat of litter, wildfire, and habitat destruction. In addition, Anchorage has experienced an increase in homeless camps. It is estimated that around 3,000 individuals, including 100 violent offenders, occupy camps within Anchorage forests. These unsanctioned, transitory communities threaten forests and urban areas with litter, human waste, and an increased risk of wildfire. In 2008, Chugach State Park began revising its Master Plan in response to an increase in users. Revisions

to the plan, originally adopted in 1980, will address increased use, access issues, and resource protection resulting from the rapid growth in Anchorage (Chugach State Park).

Anchorage's forests have been supporting human populations for more than 6,000 years. As Anchorage has developed, forests have remained an integral part of the natural beauty and wilderness that characterizes both the community and life in Alaska. Forests not only support the quality of life in Anchorage, but also the lifestyle choices of residents and visitors. In addition, forests support the existence of wildlife that is such an important part of the culture, identity, and character of Anchorage. There will always be threats (human and natural) to Anchorage's forests, but through proactive management, preservation strategies, and wise development choices, the Anchorage community will forever enjoy the benefits of this vital and valuable natural resource.



Forests support not only the quality of life in Anchorage, but also the lifestyle choices of residents and visitors.

Chapter 2: Anchorage Forest Assessment

Evidence exists that to be healthy and sustainable, a community must integrate the natural environment into urban development design. Trees and vegetation provide critical environmental services, which in turn affect quality of life. Urban and natural forests work to mitigate the effects of urbanization and development and protect and enhance life within the community through:

- **Air quality improvement.** Trees and forests increase oxygen levels through photosynthesis; intercept particulate matter (PM₁₀) such as dust, ash, pollen, and smoke; and absorb gaseous pollutants such as ozone (O₃), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂)
- **Preserving water quality.** Through interception of stormwater and snowmelt runoff and improving soil infiltration, trees protect lakes, streams, and the inlet by reducing erosion and preventing sediment loading in surface waters.
- **Providing wildlife habitat.** Trees and forests provide critical habitat (foraging, nesting, spawning, etc.) for mammals, salmon, and bird species.
- **Reduction in atmospheric carbon dioxide (CO₂).** Forests directly reduce CO₂ in the atmosphere through growth and sequestration of CO₂ as woody and foliar biomass.
- **Increased property values/aesthetics.** Trees increase the sale price of property and promote business by stimulating more frequent and extended shopping and a willingness to pay more for goods and services (Wolf, 2007).
- **Opportunities for recreation.** Forests provide limitless opportunities for recreation, offering a healthful respite from the pressures of work and everyday stress.

Stunning natural beauty, wildlife, and a strong connection with the environment are interwoven into the culture, history, and identity of Anchorage. As Anchorage continues to grow and develop, preserving urban trees and natural forests is vital to sustaining the quality of life enjoyed and expected by the community. Preservation requires recognition of the value of forests and the environmental services they provide, as well as a commitment to smart growth practices.

In recognition of the value of trees and forests, the Municipality of Anchorage has taken steps to develop a comprehensive urban forestry program, including conducting an inventory of public street trees, developing an urban forest management plan, and hiring the first municipal forester in the state of Alaska. As a continuation of those efforts, the Municipality and the State of Alaska Division of Forestry Community Forestry Program contracted with Davey Resource Group (DRG) in February 2010 to undertake an assessment of forest resources within the Municipality of Anchorage (MOA). Intended to establish and benchmark the current status of Anchorage's forest resource, the assessment provides the following information:

- **Tree canopy cover.** Using remote image sensing, the project identified and quantified the extent and location of canopy (including both trees and shrubs) within the municipal boundary, providing a baseline for measuring future changes. This information becomes a part of the Municipality's GIS database.
- **Species composition.** MOA Land Cover data and National Land Cover Database (NLCD) information was used to extract land cover classifications to illustrate diversity and levels of succession.

- **Canopy coverage relative to land use.** Analysis of tree canopy in relation to land use and development can help identify trends and provide information for future decision-making processes.
- **Defining value and benefit.** Identifying the ways in which people value forestland and defining the benefits of forests to people and wildlife provides a perspective necessary for shared vision, communication, and policymaking.
- **Identification of threats.** MOA and state forestry professionals worked with DRG to identify threats to the health and sustainability of Anchorage's forests.
- **An estimation of environmental benefits.** Sample inventories were analyzed using i-Tree *Streets* to quantify the environmental benefits per acre provided by two different forest types (paper birch/deciduous and mixed forest).
- **An account of current management policies, activities, and budget.**

The assessment considered all canopy cover within the municipal boundary (Figure 5), including trees in developed and natural forested areas. The resulting information provides a foundation for the development of long-term management goals and allows managers and residents to make informed decisions about budgetary and policy support and management priorities. The analysis also establishes benchmarks for measuring the success of future management strategies.

Methods and Materials

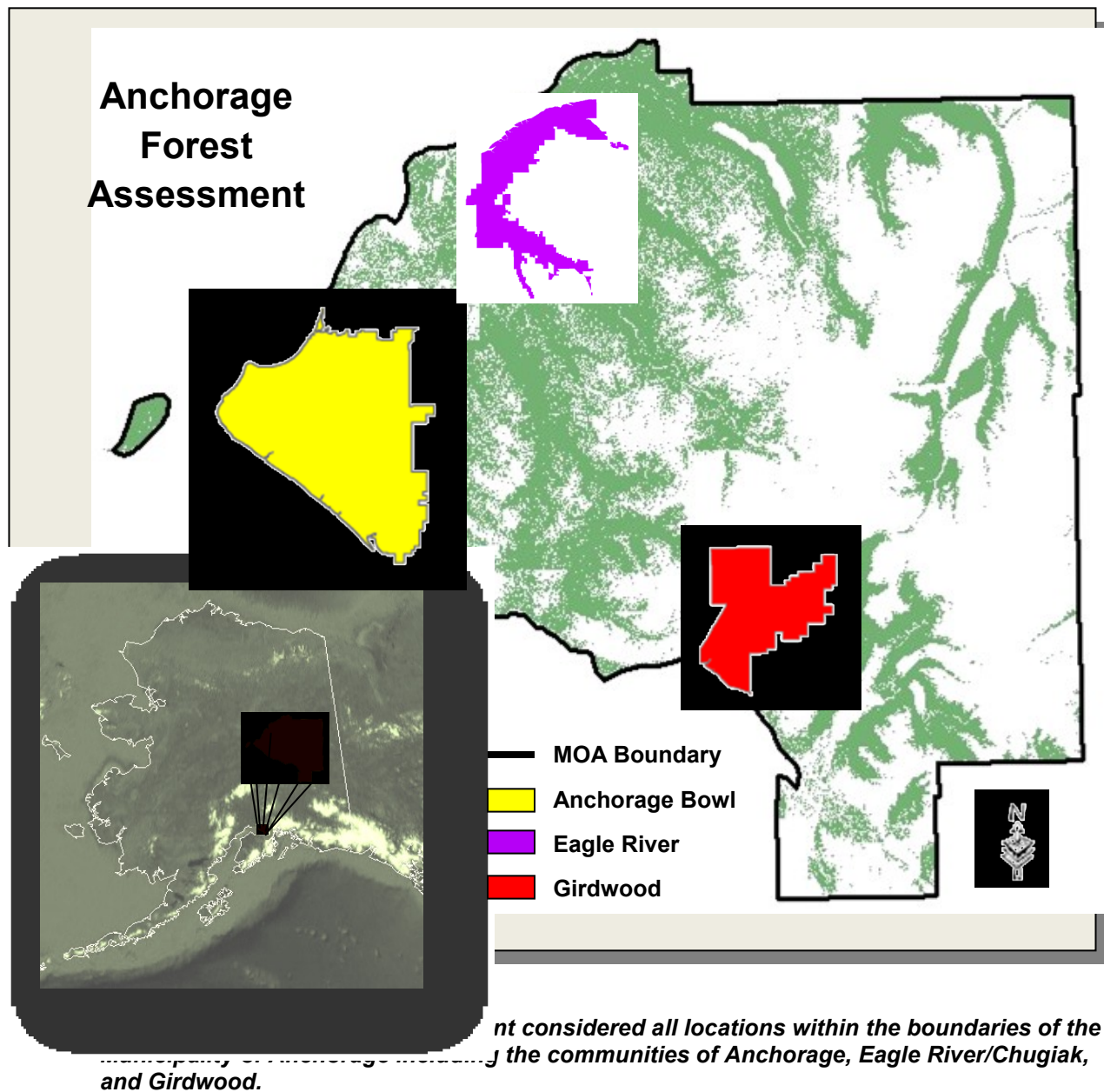
To extract canopy cover, DRG used aerial imagery from the following sources:

- Municipality of Anchorage
- Alaska Geospatial Data Clearinghouse
- Alaska Division of Forestry
- Multi-Resolution Land Characteristics Consortium

Visual Learning Systems Feature Analyst[®] software was used for the initial semi-automated feature extraction of the canopy layer. ESRI ArcGIS[®] was used to edit and digitize canopy during quality checking and quality assurance processes, in addition to geoprocessing and analysis of the final canopy layer. MOA land cover layer and National Land Cover Data (NLCD) were used to estimate canopy where imagery was unavailable. **Tree canopy cover refers to both tree and shrub canopy.** Trees are not easily distinguished from shrubs through remote sensing without multiple, high-resolution data sets and a more sophisticated level of analysis than was feasible for this study.



Tree canopy cover includes both trees and woody shrubs and is illustrated here in this section of the Campbell Creek Greenbelt.



The Anchorage Forest Assessment considered all locations within the boundaries of the Municipality of Anchorage including the communities of Eagle River and Girdwood (Figure 5).

MOA GIS layers were used to calculate tree canopy cover specific to location, ownership, and land use. MOA land cover layer, where available, was used to estimate tree canopy cover composition. All other areas were estimated using NLCD coarse image data. A right-of-way (ROW) 'pseudo' layer was developed from MOA parcel and street centerline layers. For this analysis, local streets were assigned a 60-foot ROW buffer (30' On-Center [OC]), secondary streets were assigned an 80-foot ROW buffer (40' OC), and major roads were assigned a 100-foot ROW buffer (50' OC). Reflective of MOA parcel and street centerline coverage, the ROW layer provides only partial coverage of the MOA in and around community boundary areas. MOA GIS layers provided lake boundaries and stream centerlines within and near community boundaries. To access tree canopy cover in stream corridors and lake boundaries, DRG created a

25-foot buffer from lake boundaries and a 35-foot on-center (OC) buffer from stream centerline. Tree canopy cover on trails was based on a 25-foot (OC) buffer zone. A more detailed description of the imagery and processes used in this assessment can be found in Appendix A.

To determine the value of Anchorage forests, DRG researched community planning documents and current policies and ordinance pertaining to trees and forests. The benefits and value of Anchorage forests were estimated for two representative sample forest plots using plot-specific inventory data along with i-Tree *Streets*, a STRATUM Analysis Tool (*Streets* v 3.0.4; STRATUM v 3.0.5) to describe condition, composition, and relative age and to quantify benefits including, air quality, stormwater, carbon sequestration, and aesthetic (Chapter 3). In addition, the assessment utilized a public survey to better understand how Anchorage residents view the forest and to identify which forest benefits and services are most important to the community.

Threats to Anchorage forests were identified and assessed through interviews with state and municipal forestry officials and other stakeholders and use of Forest Health Conditions in Alaska annual reports (USDA 2006-2010).

Overview

The Municipality of Anchorage (MOA) encompasses an area of 1,955 square miles including the Anchorage bowl, Eagle River, Chugiak, Birchwood, Peters Creek, Eklutna, and Girdwood. Forestlands within the MOA include both coastal (e.g., Girdwood) and boreal forests (e.g., Eagle River) with significant differences in weather conditions, precipitation, and species composition. Excluding large bodies of water and areas above the tree line, including bare rock, perennial snow, and ice, the MOA has approximately 1,078 square miles (689,661 acres) with the potential to support tree canopy. Using remote image sensing and GIS analysis, DRG determined that the following information characterizes Anchorage's forest resource:

- 633 miles² (405,297 acres) of tree canopy, including trees and woody shrubs, was identified throughout the MOA, for an average overall tree canopy cover of 59%.
- 39 miles² (24,710 acres) of tree canopy is within the Anchorage bowl boundary, for an average tree canopy cover of 35%.
- 44 miles² (28,273 acres) of tree canopy is within Eagle River boundaries, for an average tree canopy cover of 58%.
- 13.5 miles² (8,629 acres) of tree canopy is within Girdwood boundaries, for an average tree canopy cover of 42%.
- 477 miles² (305,025 acres) of tree canopy is within parks, greenbelts, and open space, for an average tree canopy cover of 42%. This includes 364 miles² (233,073 acres) in Chugach State Park (average tree canopy cover, 76%), 98 miles² (62,562 acres) in Chugach National Forest (average tree canopy cover, 56%) and 15 miles² (9,390 acres) in municipal parks (average tree canopy cover, 67%).
- 25% of Anchorage's forestland is composed of deciduous forest, 17% is conifer forest, 8% is mixed deciduous/conifer, 5% is other species, and 45% is low shrubs, including willow, alder, and other species (MOA Land Cover/NLCD).
- Municipality-wide, Chugach State Park has the highest average tree canopy cover (76%), followed by municipal parks (67%), Heritage Land Bank (HLB) (63%), municipal-owned

parcels (59%), Chugach National Forest (56%), state-owned parcels (43%), federal-owned parcels (43%), residential use (44%), and commercial/industrial use (14%).

- Within the bowl, municipal parks have the highest average tree canopy cover (68%), followed by federal-owned parcels (67%), municipal parcels (57%), HLB (52%), residential (38%), state-owned parcels (24%), and commercial/industrial use (10%).
- Within Eagle River/Chugiak, HLB parcels have the highest average tree canopy cover (86%), followed by federal-owned parcels (81%), municipal-owned parcels (63%), residential use (55%), state-owned parcels (51%), and commercial/industrial use (22%).
- Within Girdwood, municipal-owned parcels and HLB parcels have the highest average tree canopy cover (66%), followed by state-owned parcels (26%), and federal-owned parcels (22%).
- Municipality-wide, 16 miles² (10,457 acres) of tree canopy is within stream corridors and lake buffers, for an average tree canopy cover of 55%.
- Municipality-wide, 3 miles² (1,933 acres) of tree canopy is within trail corridors, for an average tree canopy cover of 43%.

The municipality-wide tree canopy cover average of 59% is well above the canopy goal of 40% overall canopy suggested by American Forests for communities in the Northwest (www.americanforests.org). However, considering the size of the municipality and the inclusion of Chugach State Park and Chugach National Forest lands, the overall tree canopy cover is not unexpected. Furthermore, it is important to note that approximately 45% of the overall tree canopy cover is estimated to be a mix of low shrubs, scrub, and sparse vegetation comprised primarily of willow and alder species. While this type of cover is beneficial for wildlife browsing and habitat, the environmental benefits are less than what is produced from larger species forests (e.g., deciduous, conifer, and mixed).

Considering tree canopy cover at the community level, the average overall tree canopy cover of 35% in the Anchorage bowl is below the recommendation. In order to reach an overall tree canopy cover of 40%, an additional 3,858 acres of tree canopy cover would need to be added within the bowl. Girdwood's 42% average tree canopy cover is slightly above the recommended goal and Eagle River/Chugiak's tree canopy cover average of 58% is significantly above the recommended goal.

Fifty percent (50%) tree canopy cover is the recommended goal for suburban residential areas and 25% for urban residential. The Anchorage forest assessment did not differentiate between suburban and urban residential and included both single-family and multi-family units. Municipality-wide, residential areas have an average tree canopy cover of 44%. At the community level, residential areas average 38% tree canopy cover in the bowl and 55% tree canopy cover in Eagle River/Chugiak. A residential GIS layer for Girdwood was not available.

Fifteen percent (15%) tree canopy cover is the recommended goal for central business districts. The Anchorage Forest Assessment considered tree canopy cover for commercial and industrial locations overall. Municipality-wide, tree canopy cover for commercial/industrial areas average 14%. At the community level, commercial/industrial locations average 10% in the bowl and 22% in Eagle River/Chugiak.

Anchorage Tree Canopy Cover Assessment

Overall Tree Canopy Cover

Within the municipal boundary (1,955 square miles), nearly 217 square miles are covered by large bodies of water, including areas over Cook Inlet and Turnagain Arm. In addition, municipal lands include areas that do not have the potential to support tree canopy cover, including approximately 315 square miles of perennial ice and snowcap; 322 square miles of bare rock, sand, and clay; and 23 square miles of lakes (Figure 7). Excluding these areas, there are 1,078 square miles within the municipality with the potential to support tree canopy. Through remote image sensing, the forest assessment identified 633 square miles of tree canopy cover (Figure 6), including trees and woody shrubs. This equates to an overall tree canopy cover of 59%.

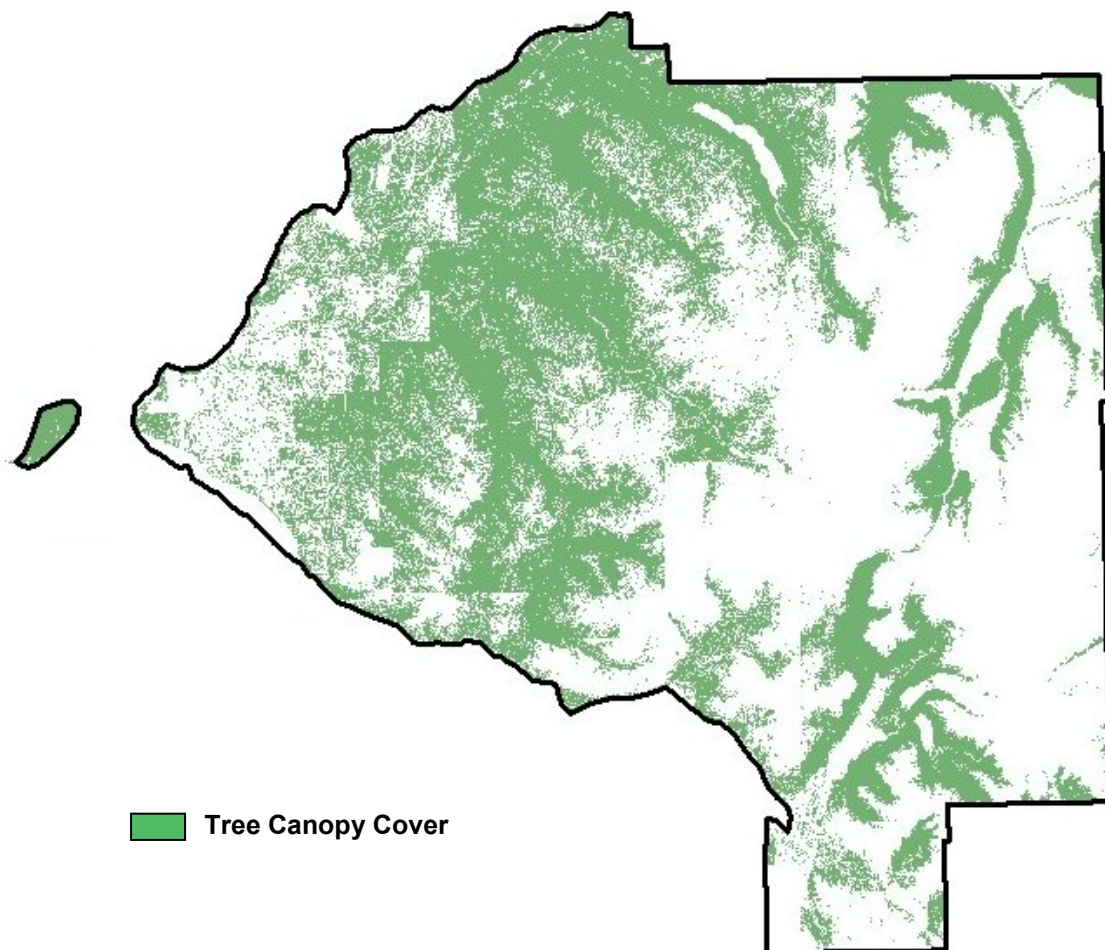


Figure 6. Municipal boundary illustrating location and extent of tree canopy cover.

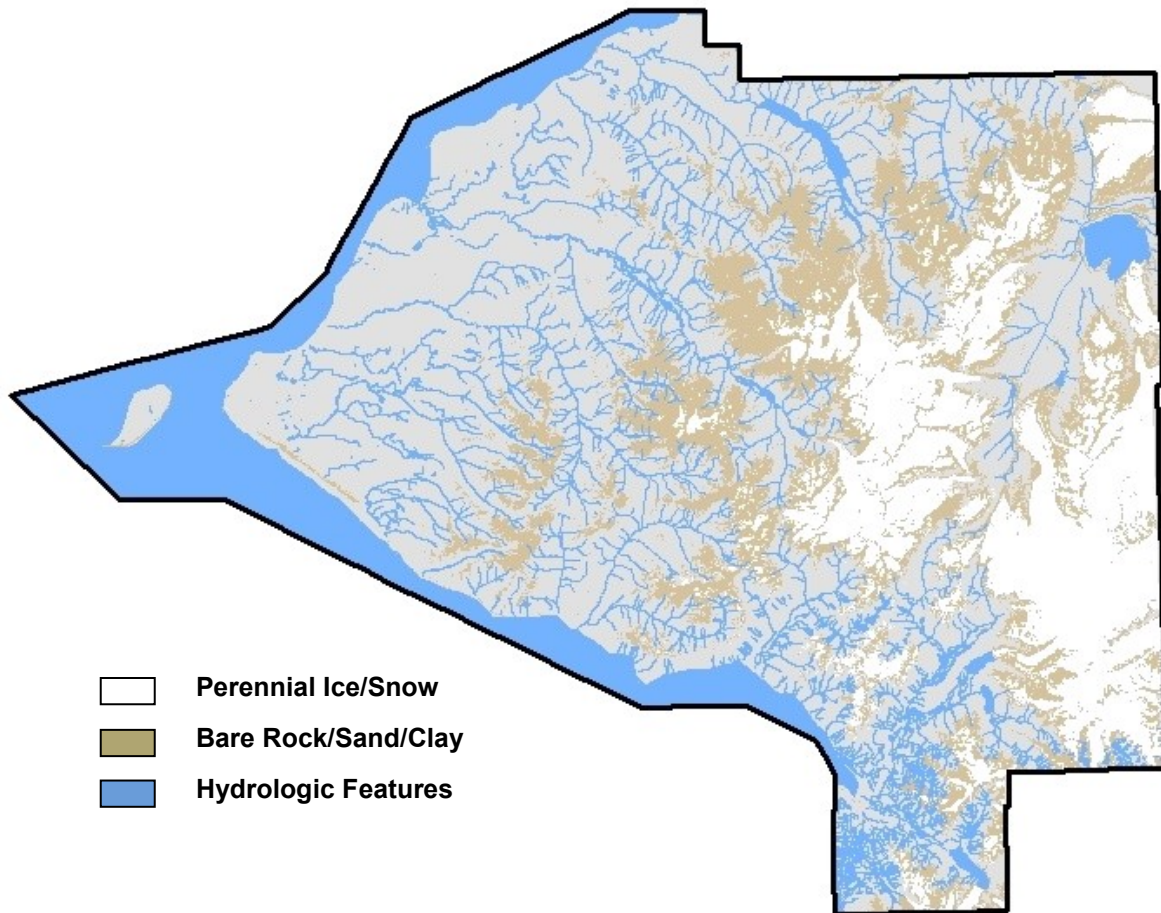


Figure 7. Municipality boundary showing location and extent of areas without the potential to support tree canopy cover, including large water bodies over Cook Inlet and Turnagain Arm.

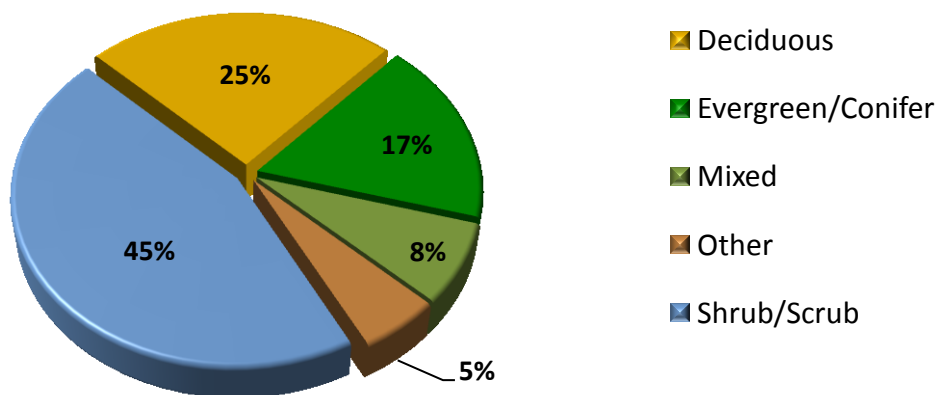


Figure 8. Municipality of Anchorage Land Cover Composition (MOA LC and NLCD).

Overall Tree Canopy Composition

Based on Municipality of Anchorage Land Cover (MOA LC) and National Land Cover Data (NLCD) coarse data, the forest assessment estimates that the species composition (Figure 8) of the overall tree canopy cover is:

- Deciduous forest, 25%
- Conifer forest, 17%
- Mixed deciduous/conifer forest, 8%
- Other (unknown/unidentified), 5%
- Shrubs (low-mix willow/alder), 45%

Table 1. Forest Composition: Entire Municipality (MOA and NLCD LC)

Forest Composition - Overall	Acres	Canopy %
Evergreen/Conifer		
Black Spruce Complex: Woodland	1549.97	0.38%
Black Spruce: Closed	2445.42	0.60%
Black Spruce: Open	10159.60	2.51%
Black Spruce: Woodland	2778.78	0.69%
White Spruce Complex: Open	745.60	0.18%
White Spruce Complex: Woodland	39.92	0.01%
White Spruce: Open	8865.78	2.18%
White Spruce: Woodland	1672.61	0.42%
Sitka Spruce: Closed	2390.53	0.59%
Spruce Complex: Open	379.14	0.09%
Spruce Complex: Woodland	13.53	0.00%
Spruce-Hemlock Complex: Closed	826.79	0.20%
Spruce-Hemlock: Closed	5285.19	1.30%
Spruce-Hemlock: Open	284.54	0.07%
West Hemlock Complex: Closed	334.37	0.08%
Western Hemlock: Closed	1824.30	0.45%
Mountain Hemlock Complex: Closed	510.10	0.13%
Mountain Hemlock: Closed	1654.05	0.41%
Stunted Mountain Hemlock: Open	2113.92	0.52%
Other Conifer: Woodland	1935.93	0.48%
NLCD - Evergreen Forest	25537.32	6.30%
All Conifer	71347.38	17.60%
Deciduous/Hardwood		
Paper Birch: Closed	24778.46	6.11%
Paper Birch: Open	5750.38	1.42%
Paper Birch: Woodland	571.40	0.14%
Balsam Poplar: Open	1976.66	0.49%
Balsam Poplar: Woodland	349.44	0.09%
Aspen: Woodland	2997.47	0.74%
Mixed deciduous: Open	8867.51	2.19%
Mixed deciduous: Woodland	336.27	0.08%
Tall shrub: Closed: Alder	29559.38	7.29%
Tall shrub: Closed: Mix	1724.66	0.43%
Tall shrub: Open: Alder	3972.19	0.98%

Forest Composition - Overall	Acres	Canopy %
Tall shrub: Open: Mix	16003.24	3.95%
NLCD - Deciduous Forest	3234.86	0.80%
All Deciduous	100121.92	24.70%
Mixed Deciduous/Conifer		
Mixed deciduous-conifer: Closed	11638.53	2.87%
Mixed deciduous-conifer: Open	13565.40	3.35%
Mixed deciduous-conifer: Woodland	5367.96	1.32%
NLCD - Mixed Forest	534.97	0.13%
All Mixed Deciduous/Conifer	31106.86	7.68%
Shrub		
Low shrub: Closed: Mix	27120.72	6.69%
Low shrub: Open: Alder	792.70	0.20%
Low shrub: Open: Mix	35051.56	8.65%
Low shrub: Open: Willow	6715.69	1.66%
Dwarf Shrub	23134.23	5.71%
NLCD - Shrub/Scrub	78112.87	19.27%
All Shrub	170927.76	42.17%
Sparse Vegetation	11758.16	2.90%
Other	20034.79	4.94%
All Land Cover	405296.88	100.00%

Overall Tree Canopy Cover on State, Federal, Municipal, and Private Lands

The Municipal GIS parcel layer provides only partial coverage of the MOA boundary in locations with the greatest amount of urban development (Figure 9). Based on available parcel information, the Municipality includes the following:

- **State-owned** (96 square miles) with 41 square miles of canopy, for an average tree canopy cover of 43%.
- **Federal-owned** (40 square miles, including some parcels within the Chugach State Park) with 17 square miles of canopy, for an average tree canopy cover of 43%.
- **Municipal-owned** (41 square miles) with 24 square miles of canopy, for an average tree canopy cover of 59%.
- **Private-owned** (58 square miles, residential and commercial) with 22 square miles of canopy, for an average tree canopy cover of 38%.

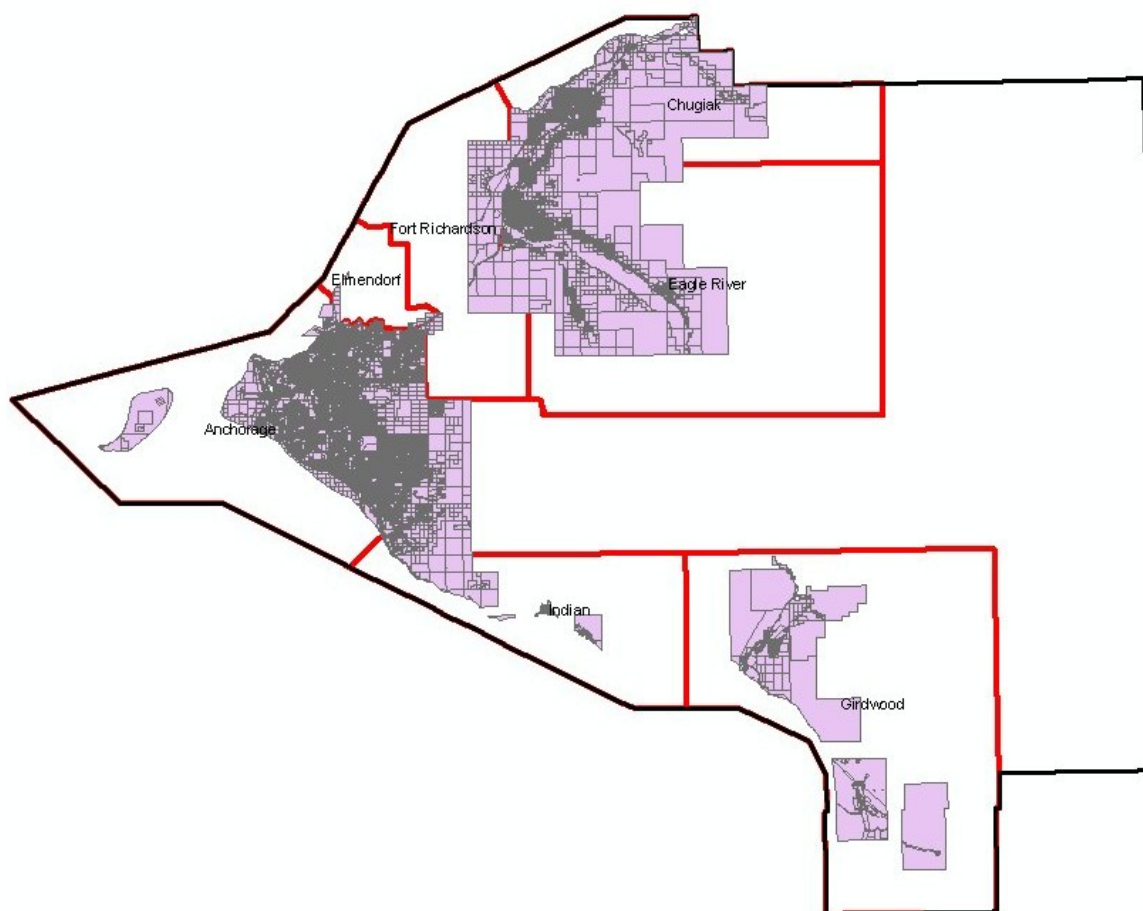


Figure 9. MOA boundary showing extent of GIS parcel data

Overall Tree Canopy Cover by Land Use

Residential

The Municipality currently has 47 square miles of land zoned residential, including single- and multi-family parcels in Anchorage Bowl, Eagle River/Chugiak, and Girdwood. Residential parcels include 21 square miles of tree canopy cover for an overall average of 44%.

Commercial

Commercial and Industrial zoned parcels within the Municipality total 11 square miles (7,075 acres), with 1,012 acres of tree canopy cover and an average tree canopy cover of 14%.

Heritage Land Bank

Heritage Land Bank (HLB) is municipal land currently uncommitted and held in reserve for future use, including lands transferred to the Municipality from the State of Alaska under the Municipal Entitlement Act. The HLB inventory includes 17 square miles of land that may be designated for residential, commercial, industrial, open space, or recreational use. HLB parcels have approximately 11 square miles of canopy and an average tree canopy cover of 62%.

Right-of-Way

ROW corridors were analyzed in and around community boundaries where GIS was available. The assessment considered 24 square miles of ROW corridors. Total tree canopy within these ROW corridors is five square miles with an average tree canopy cover of 20%.

Recreational and Open Space

Municipality-wide, Anchorage has 740 linear miles of trails. To assess tree canopy cover along the trail system, the study assigned a 25-foot buffer on the trail centerline and assessed all canopy cover within the resulting 50-foot-wide corridor. Based on this methodology, the MOA has seven square miles of trail corridor, including three square miles of canopy for an average tree canopy cover of 43%.

Area within the MOA dedicated to parks, greenbelts, and open space:

- Chugach State Park, 726 square miles
- Chugach National Forest, 384 square miles
- Municipal Parks, 22 square miles
- Total park, greenbelt, and open space, 1,131 square miles
- Tree canopy cover for all parks, greenbelt, and open space is 477 square miles
- Average tree canopy cover for all three areas is 42%

Chugach State Park includes 247 square miles without the potential to support tree canopy cover, including 173 square miles of bare rock, and 74 square miles of ice and perennial snowcap, resulting in the following:

- 478 square miles with potential to support canopy in Chugach State Park
- 362 square miles of total tree canopy cover
- Average tree canopy cover, 76%

Chugach National Forest includes 208 square miles without the potential to support tree canopy cover, including 65 square miles of bare rock and 143 square miles of ice and perennial snowcap, resulting in the following:

- 176 square miles with potential to support tree canopy in Chugach National Forest
- 98 square miles of total tree canopy cover
- Average tree canopy cover, 56%

Overall, municipal parks include:

- 22 square miles with potential to support tree canopy in municipal parks
- 15 square miles of total tree canopy cover within municipal parks
- Average tree canopy cover, 67%

The municipality includes 14 parks larger than 100 acres encompassing 18 square miles with 13 square miles of tree canopy cover and an overall 70% tree canopy cover average. The largest municipal park, Far North Bicentennial/Hillside Park (seven square miles), has five square miles of tree canopy cover and an average tree canopy cover of 80% (Table 2). A complete list of municipal parks, including tree canopy cover figures is included in Appendix C.

Table 2. Municipal parks larger than 100 acres

Municipality of Anchorage Municipal Parks >100 Acres	Canopy (Acres)	Total Area (Acres)	Canopy %
Far North Bicentennial/Hillside Park	3458.34	4316.00	80.13%
Beach Lake Park	779.19	1580.45	49.00%
Kincaid Park/Point Campbell	1043.62	1501.83	69.49%
Bird Creek Regional Park	836.42	1016.76	82.00%
Ruth Arcand Park	336.12	535.37	62.78%
Mirror Lake/Edmonds Lake Park	444.41	494.63	89.85%
Chester Creek Greenbelt	264.88	460.07	57.58%
Russian Jack Springs Park	224.33	303.96	73.80%
Campbell Creek Greenbelt	163.37	291.17	56.11%
Connors Lake Park/Connors Bog Park	85.68	256.34	33.42%
Point Woronzof Park	106.37	191.82	55.45%
Rabbit Creek Greenbelt	138.56	174.82	79.26%
Section 25	116.10	143.25	81.00%
Earthquake Park	96.66	127.35	75.90%
Total Parks >100 Acres	8,094.04	11,393.80	71.04%

Overall Tree Canopy Cover by Comparison

A comparison of average overall tree canopy cover by a variety of land use and parcel ownership designations illustrates the relationship of tree canopy cover to use. Within the overall municipal boundary, Chugach State Park has the greatest average tree canopy cover (76%), followed by municipal parks (67%), and HLB (62%). The lowest average tree canopy cover (14%) is on land zoned for commercial and/or industrial use (Figure 10).

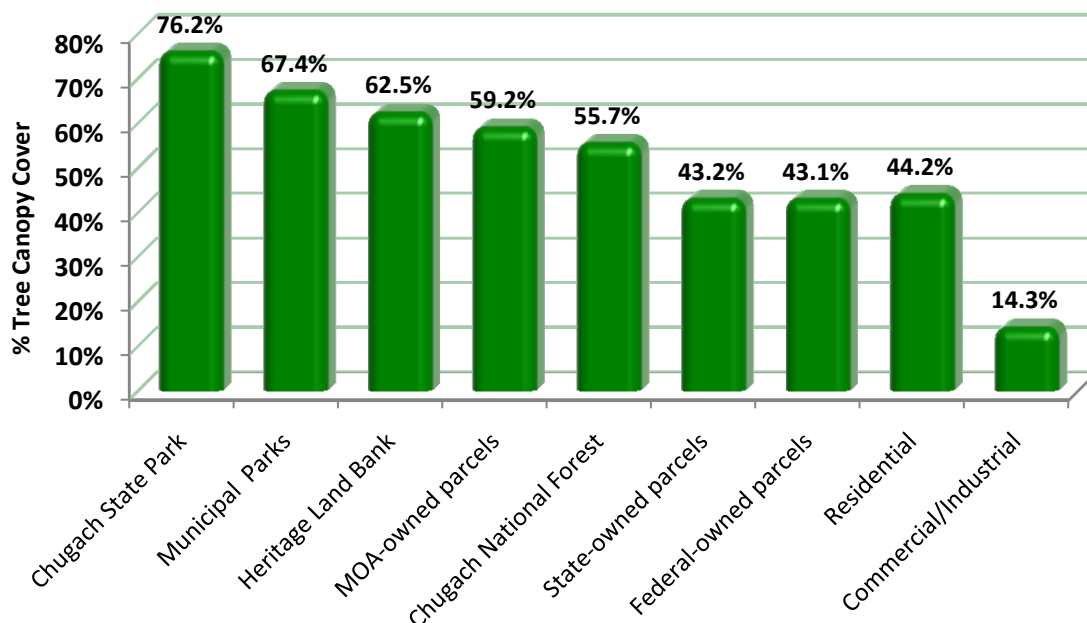


Figure 10. Tree canopy cover comparison for a variety of land use and parcel ownerships within the overall municipal boundary.

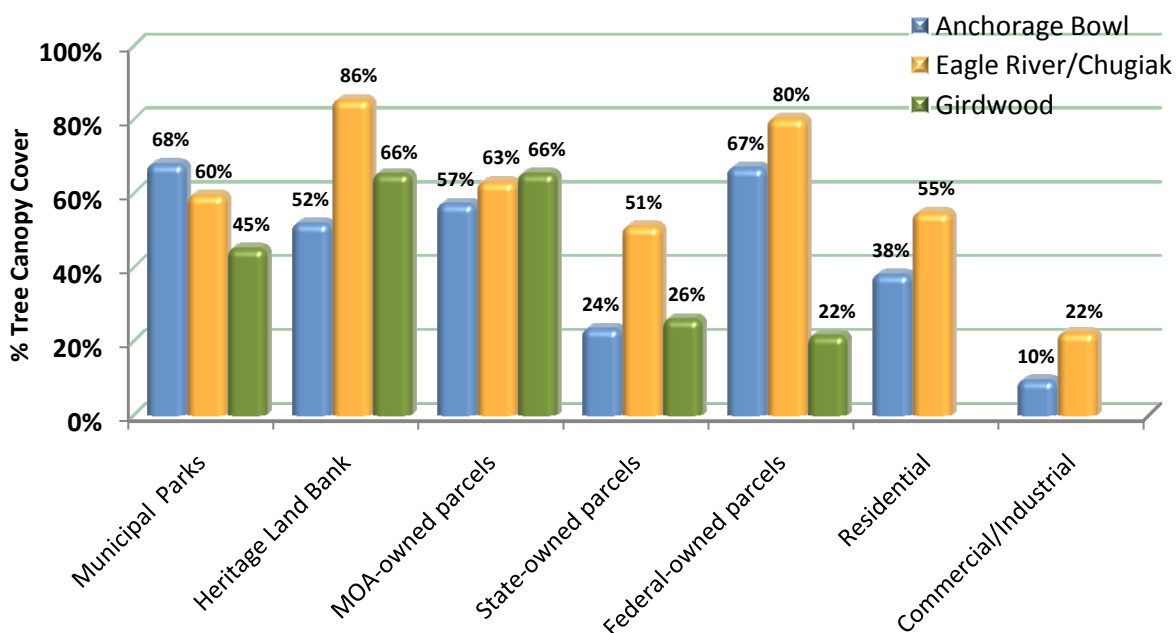


Figure 11. Tree canopy cover comparison between community boundaries for a variety of land use and parcel ownerships.

Overall Tree Canopy Cover of Lakes, Rivers, and Streams

Municipal GIS layers identify the centerline of rivers and streams in and adjacent to urban areas. To assess canopy cover bordering rivers and streams, the study assigned a 35-foot buffer to the centerline for an overall stream corridor width of 70 feet. Based on areas covered by the GIS hydrologic layer, the forest assessment identified 28 square miles of river and stream corridors, which include 15 square miles of tree canopy cover and an overall tree canopy cover of 54%.

To assess canopy cover bordering lakes, the project assigned a 25-foot buffer extending from the lake boundary lines and assessed tree canopy cover within those boundaries. Based on GIS data, the study identified 494 acres of lake buffer, with a total of 430 acres of tree canopy cover and an average tree canopy cover of 87%.



Stream corridors, like this one in the bowl, have an average tree canopy cover of 54%.

Anchorage Bowl Tree Canopy Cover

The Anchorage bowl (Figure 12) encompasses an area of 112 square miles within the overall MOA boundary (Figure 5). Within the bowl, there are 1.3 square miles of bare rock, sand, and clay that does not have the potential to support canopy. The remaining 110 square miles of land has the potential to support canopy cover. However, this assessment did not include the identification and consideration of existing buildings and other hardscape within the bowl. Therefore, it can be assumed that the actual area able to support tree canopy is substantially less. The analysis identified 39 square miles of tree canopy cover, including trees and woody shrubs. This equates to an overall tree canopy cover of 35%.

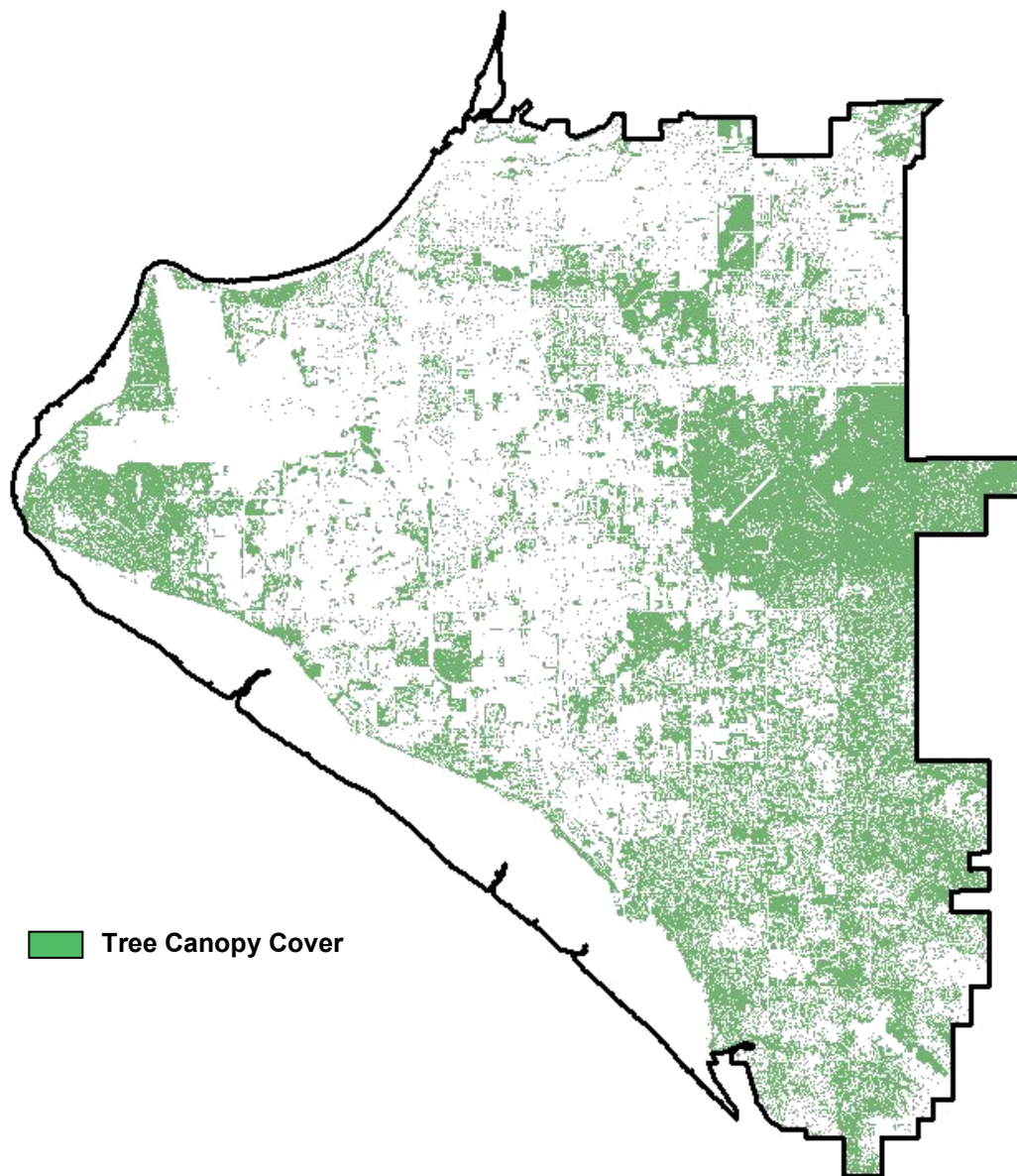


Figure 12. Anchorage bowl boundary illustrating location and extent of tree canopy cover.

Anchorage Bowl Tree Canopy Composition

The Anchorage Forest Assessment used the MOA land cover layer (30 x 30-meter resolution) to estimate canopy composition within the bowl. Thirty-two percent (7,863 acres) of the overall tree canopy cover (24,710 acres) is composed of forests that are predominantly deciduous (hardwood), followed by 22% (5,491 acres) of forests that are predominantly conifer, and 13% (3,238 acres) of forests that are mixed conifer-deciduous with neither being the dominant species. Eighteen percent (4,489 acres) of the canopy is composed of other or unidentified (unknown) species. The remaining 15% (3,629 acres) is predominately shrub and sparse vegetation cover (Figure 13).

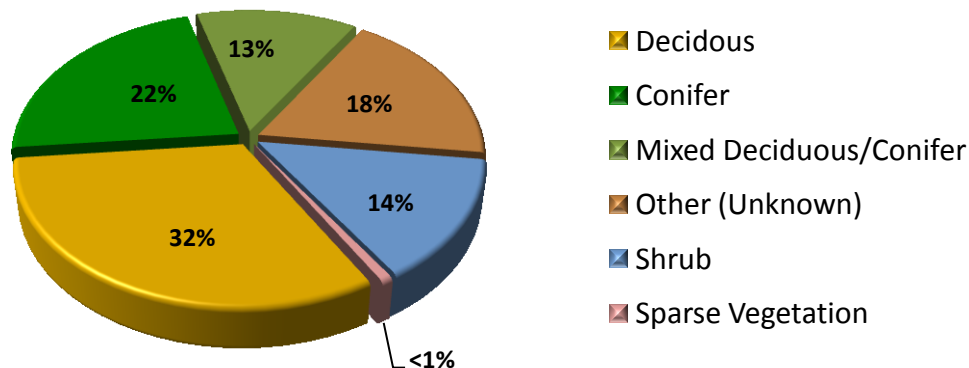


Figure 13. Overall forest type composition within the bowl (MOA LC)

Table 3. Species composition in the bowl (MOA LC)

Species - Anchorage Bowl	Acres	Canopy %
Tall Shrub, Alder/Mix	4521.14	18.30%
Other (Unknown)	4489.32	18.17%
Black Spruce	3355.32	13.58%
Mixed Deciduous-Conifer	3238.36	13.11%
Paper Birch	2852.02	11.54%
Low Shrub	2376.83	9.62%
White Spruce	1155.37	4.68%
Dwarf Shrub	1069.41	4.33%
Mixed Deciduous	402.62	1.63%
Spruce-Hemlock	371.47	1.50%
Mountain Hemlock	352.64	1.43%
All Sparse Vegetation	182.75	0.74%
Western Hemlock	98.93	0.40%
Other Conifer	85.87	0.35%
Balsam Poplar	50.33	0.20%
Spruce	44.86	0.18%
Aspen	36.42	0.15%
Sitka Spruce	26.31	0.11%
Total Canopy	24709.92	100.00%

Nineteen percent (19%) of forests in the bowl are composed primarily of spruce (*Picea* spp.), which account for 4,582 acres of the overall tree canopy cover, including 3,355 acres (14% of overall tree canopy cover) of black spruce (*Picea mariana*), 1,155 acres (5%) of white spruce (*Picea glauca*), and 26 acres (<1%) Sitka spruce (*Picea sitchensis*). A mix of tall shrubs, dominated by alder (*Alnus* spp.) mix, accounts for 4,521 acres and 18% overall tree canopy cover. Paper birch (*Betula papyrifera*) comprises 2,852 acres (12% overall) (Figure 14) (Table 3).

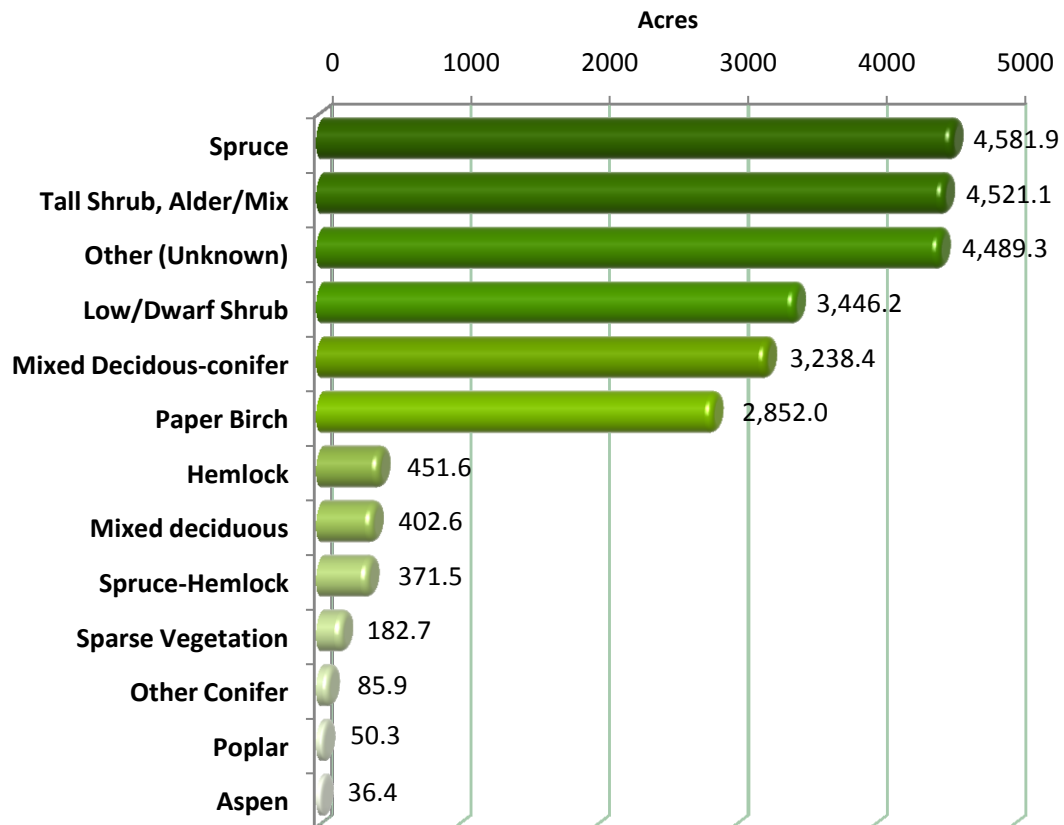


Figure 14. Anchorage bowl canopy cover by genus (MOA LC)

Table 4. Forest Composition within the bowl (MOA LC)

Forest Composition - Anchorage Bowl	Acres	Canopy %
Evergreen/Conifer		
Black Spruce: Open	2222.59	8.99%
Black Spruce: Closed	377.05	1.53%
Black Spruce: Woodland	550.70	2.23%
Black Spruce Complex: Woodland	204.97	0.83%
White Spruce: Open	883.94	3.58%
White Spruce: Woodland	202.33	0.82%
White Spruce Complex: Open	67.83	0.27%
White Spruce Complex: Woodland	1.25	0.01%
Sitka Spruce: Closed	26.31	0.11%
Spruce Complex: Open	44.60	0.18%
Spruce Complex: Woodland	0.26	0.00%
Spruce-Hemlock: Open	4.12	0.02%
Spruce-Hemlock: Closed	279.64	1.13%
Spruce-Hemlock Complex: Closed	87.71	0.35%
Western Hemlock: Closed	94.73	0.38%
Western Hemlock Complex: Closed	4.20	0.02%
Mountain Hemlock: Closed	95.74	0.39%
Stunted Mountain Hemlock: Open	215.72	0.87%
Mountain Hemlock Complex: Closed	41.18	0.17%
Other Conifer: Woodland	85.87	0.35%
All Conifer	5490.75	22.22%
Deciduous/Hardwood		
Paper Birch: Closed	2211.52	8.95%
Paper Birch: Open	625.03	2.53%
Paper Birch: Woodland	15.47	0.06%
Balsam Poplar: Open	45.77	0.19%
Balsam Poplar: Woodland	4.56	0.02%
Aspen: Woodland	36.42	0.15%
Tall shrub: Closed: Alder	1011.77	4.09%
Tall shrub: Open: Alder	458.93	1.86%
Tall shrub: Open: Mix	3048.77	12.34%
Tall shrub: Closed: Mix	1.67	0.01%
Mixed deciduous: Open	395.77	1.60%
Mixed deciduous: Woodland	6.85	0.03%
All Deciduous	7862.52	31.82%
Mixed Deciduous/Conifer		
Mixed deciduous-conifer: Closed	1544.18	6.25%
Mixed deciduous-conifer: Open	1357.07	5.49%
Mixed deciduous-conifer: Woodland	337.11	1.36%
All Mixed Deciduous/Conifer	3238.36	13.11%
Shrub		
Dwarf Shrub	1069.41	4.33%
Low shrub: Closed: Mix	188.10	0.76%
Low shrub: Open: Mix	2047.51	8.29%
Low shrub: Open: Alder	1.10	0.00%
Low shrub: Open: Willow	140.12	0.57%
All Shrub	3446.24	13.95%
All Sparse Vegetation	182.75	0.74%
Other (Unknown)	4489.32	18.17%
All Land Cover	24709.92	100%

Anchorage Bowl Tree Canopy Cover on State, Federal, Municipal, and Private Lands

Parcel ownership within the bowl includes the following:

- **State** (3,319 acres) with 784 acres of canopy, for an average tree canopy cover of 24%.
- **Federal** (963 acres) with 647 acres of canopy, for an average tree canopy cover of 67%.
- **Municipal** (14,631 acres) with 8,405 acres of canopy, for an average tree canopy cover of 57%.
- **Private** (25,256 acres, residential, commercial, and industrial) with 8,029 acres of canopy, for an average tree canopy cover of 32%.

Anchorage Bowl Tree Canopy Cover by Land Use

Residential

The bowl has 31 square miles of land zoned residential, including single-family and multi-family parcels. Residential parcels include approximately 12 square miles of tree canopy cover for an overall average tree canopy cover of 38%.

Commercial

Commercial and Industrial zoned parcels within the bowl include 5,706 acres, with 549 total acres of tree canopy cover and an average tree canopy cover of 10%.

Heritage Land Bank

HLB in the bowl covers 3,328 acres of land that may be designated for residential, commercial, industrial, open space, or recreational use. HLB parcels have a total of 1,735 acres of canopy and an average tree canopy cover of 52%.

Right-of-Way

The bowl includes an estimated 10,417 acres of ROW with 1,556 acres of total tree canopy cover and an average tree canopy cover of 15%.

Recreational and Open Space

The bowl includes 431 linear miles of trails. To assess tree canopy cover along the trail system, the study assigned a 25-foot buffer on the trail centerline and assessed all canopy cover within the resulting 50-foot corridor. Based on this methodology, the bowl has 2,605 acres of trail corridor, including 1,097 acres of total canopy for an average tree canopy cover of 42%.

Within the bowl, there are 16 square miles (10,160 acres) of parks, greenbelts, and open space, with a total overall tree canopy of 6,926 acres, and an average canopy cover of 68%.

Far North Bicentennial/Hillside Park is the largest municipal park in the bowl, occupying 4,316 acres, with 3,458 acres of canopy and 80% tree canopy cover. Kincaid Park/Point Campbell is the next largest park (1,502 acres) with 1,044 acres of tree canopy cover (69%); followed by Ruth Arcand Park (535 acres), with 336 acres of tree canopy cover (63%)(Table 5).

Table 5. Anchorage bowl tree canopy cover in Parks >100 acres

Anchorage Bowl Parks > 100 Acres	Canopy Acres	Total Acres	Canopy %
Far North Bicentennial/Hillside Park	3458.34	4316.00	80.13%
Kincaid Park/Point Campbell	1043.62	1501.83	69.49%
Ruth Arcand Park	336.12	535.37	62.78%
Chester Creek Greenbelt	264.88	460.07	57.58%
Russian Jack Springs Park	224.33	303.96	73.80%
Campbell Creek Greenbelt	163.37	291.17	56.11%
Connors Lake Park/Connors Bog Park	85.68	256.34	33.42%
Point Woronzof Park	106.37	191.82	55.45%
Rabbit Creek Greenbelt	138.56	174.82	79.26%
Earthquake Park	96.66	127.35	75.90%
All Other Parks	986.72	2000.88	49.91%
Parks total	6926.25	10159.60	68.17%

High Tide Park (two acres) has 100% tree canopy cover, the highest of all municipal parks; followed by Bayshore Park North (11 acres), with ten acres of canopy and a tree canopy cover of 96%; and Sand Lake Park (five acres), with 4.8 acres of canopy, and a tree canopy cover of 93% (Table 6). See Appendix C for a complete listing of the more than 200 parks in the bowl, including total acres of tree canopy cover and overall canopy cover (%).

Table 6. Anchorage bowl parks >1 acre with the highest percentage of tree canopy cover

Anchorage Bowl Parks with Canopy >85%	Canopy Acres	Total Acres	Canopy %
High Tide Park	1.60	1.60	100.00%
Bayshore Park North	10.41	10.85	95.94%
Sand Lake Park	4.81	5.16	93.27%
Goose Lake Park	17.35	18.65	93.04%
Clay Park	1.22	1.32	92.18%
Charles W Smith Memorial Park	12.82	14.05	91.25%
Nelva J Wilmoth Park	1.85	2.04	91.01%
Folker Park	1.82	2.01	90.78%
Nunaka Valley Park	8.18	9.07	90.12%
Tikishla Park	1.29	1.44	89.58%
Alaska Botanical Garden	71.27	81.10	87.88%
Valley of the Moon Park	1.17	1.35	86.66%
Forsythe Park	23.29	26.95	86.43%
Turinski Park	3.71	4.30	86.16%
Linden Park	3.37	3.94	85.60%
Bayshore Park South	9.02	10.60	85.12%
James Vernon Nash Park	1.93	2.27	85.03%
All Other Parks	6552.34	9795.18	66.89%
Parks total	6926.25	10159.60	68.17%

Anchorage Bowl Tree Canopy Cover by Comparison

A comparison of average tree canopy cover by a variety of land use and parcel ownership designations within the bowl illustrates the relationship of tree canopy cover to use. Municipal Parks have the greatest average tree canopy cover (68%), followed by federal-owned parcels (67%), and municipal-owned parcels (58%). The lowest average tree canopy cover (10%) is on land zoned for commercial and/or industrial use (Figure 15).

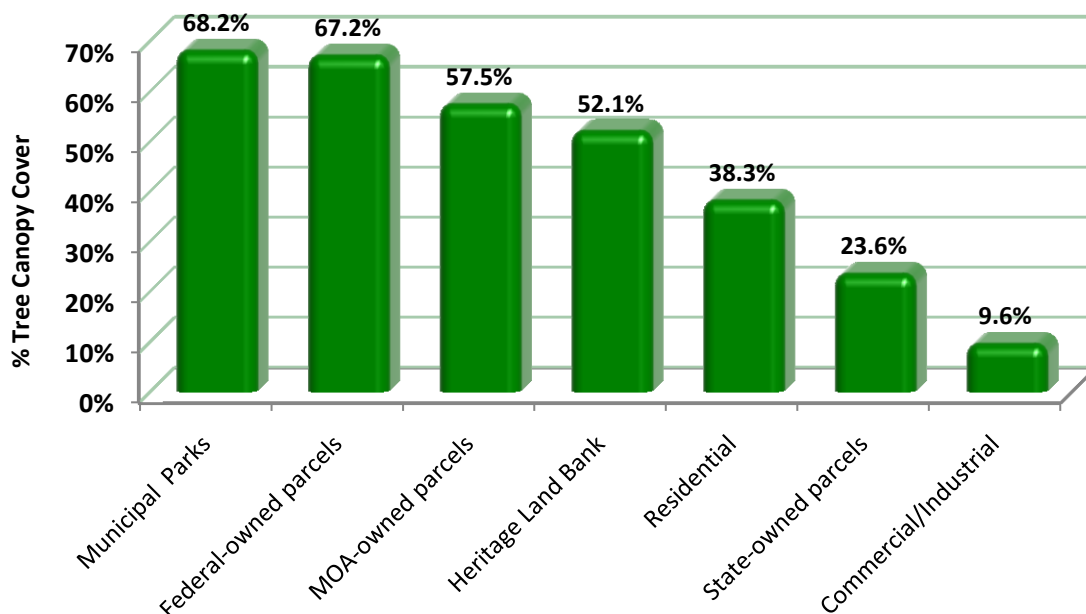


Figure 15. Comparison of percentage of tree canopy cover for a variety of land use and parcel ownership types within the bowl.

Anchorage Bowl Tree Canopy Cover of Lakes, Rivers, and Streams

Using a 25-foot buffer on lake borders and a 70-foot-wide corridor to buffer streams, the analysis identified a total hydrologic buffer zone of 1,952 acres, including 612 acres of canopy for an average tree canopy cover of 31%.

Eagle River, Chugiak, and Surrounding Communities Tree Canopy Cover

The Eagle River forestland assessment included the communities of Eagle River, Chugiak, Birchwood, Peters Creek, and Eklutna (Figure 16). The boundary encompasses an area of 76 square miles within the overall MOA boundary (Figure 5), of which there are only 69 acres of bare rock, sand, and clay. The analysis identified 44 square miles of canopy for an overall tree canopy cover of 58%.

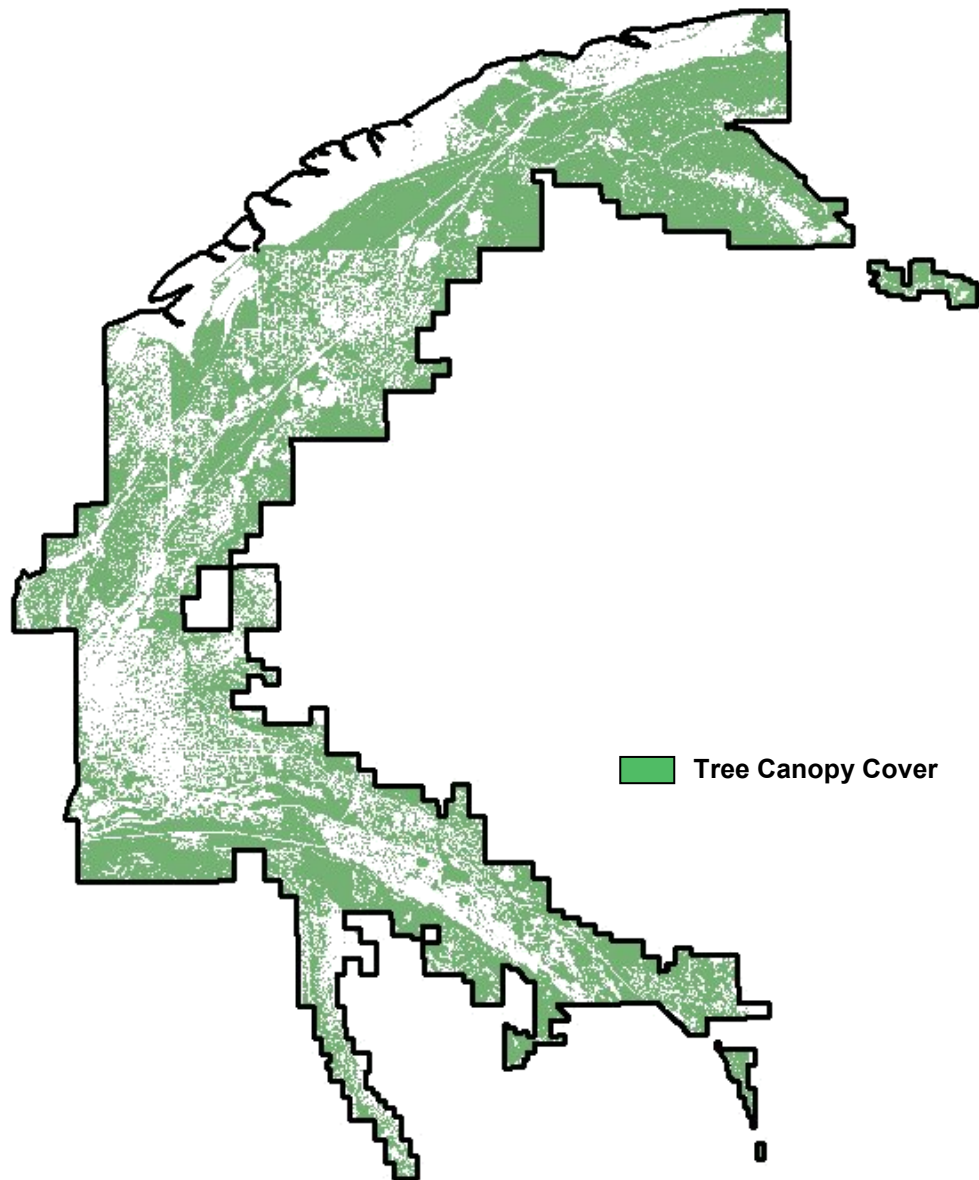


Figure 16. Eagle River/Chugiak boundary illustrating location and extent of tree canopy cover.

Eagle River/Chugiak Tree Canopy Composition

Based on MOA land cover layer (30 x 30-meter resolution), 46% (12,890 acres) of the overall tree canopy cover (28,273 acres) is composed of forests that are predominantly deciduous (hardwood), followed by 21% (5,862 acres) of conifer forests, and 20% (5,735 acres) of mixed conifer-deciduous forests. Six percent (1,563 acres) of the Eagle River/Chugiak canopy is composed of other or unidentified (unknown) species. The remaining 8% is predominately shrub and sparse vegetation cover (Figure 17).

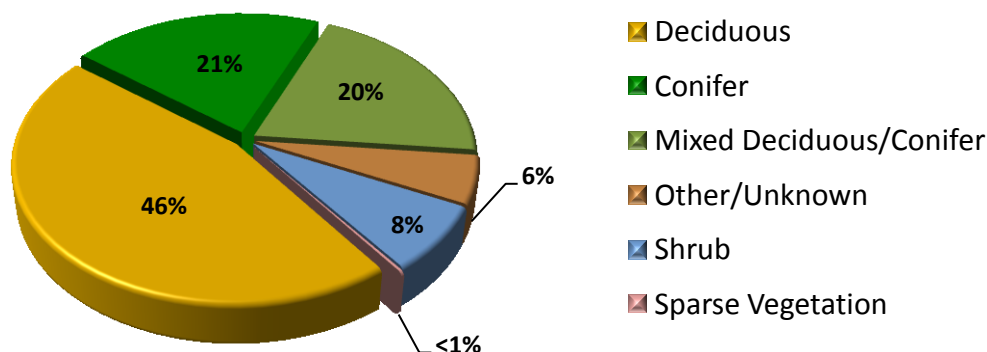


Figure 17. Overall Eagle River/Chugiak forest type composition (MOA LC)

Table 7. Eagle River/Chugiak species composition (MOA LC)

Species - Eagle River/Chugiak	Canopy Acres	Canopy %
Paper Birch	7561.00	26.74%
Mixed Deciduous-Conifer	5734.59	20.28%
Tall Shrub, Alder/Mix	3936.24	13.92%
Black Spruce	2390.37	8.45%
White Spruce	2184.95	7.73%
Low Shrub	1817.52	6.43%
Other (Unknown)	1562.72	5.53%
Mixed Deciduous	1276.19	4.51%
Mountain Hemlock	506.43	1.79%
Spruce-Hemlock	461.37	1.63%
Dwarf Shrub	345.83	1.22%
Sitka Spruce	126.81	0.45%
Balsam Poplar	106.15	0.38%
Western Hemlock	90.22	0.32%
Spruce	77.87	0.28%
Sparse Vegetation	60.46	0.21%
Other Conifer	23.87	0.08%
Aspen	10.30	0.04%
Total Canopy	28272.87	100.00%

Twenty-seven percent (27%) of forests in Eagle River/Chugiak are composed primarily of paper birch (*Betula papyrifera*), which account for 7,561 acres of the overall tree canopy cover. Twenty percent (5,735 acres) are mixed deciduous and conifer where neither species is clearly dominant and 17% (4,780 acres) are spruce forests; including 2,390 acres (8% of overall tree canopy cover) of black spruce (*Picea mariana*); 2,185 acres (8%) of white spruce (*Picea glauca*); and 127 acres (<1%) of Sitka spruce (*Picea sitchensis*). A mix of tall shrubs, dominated by alder (*Alnus* spp.) accounts for 3,936 acres, and 14% overall tree canopy cover. (Figure 18) (Table 7).

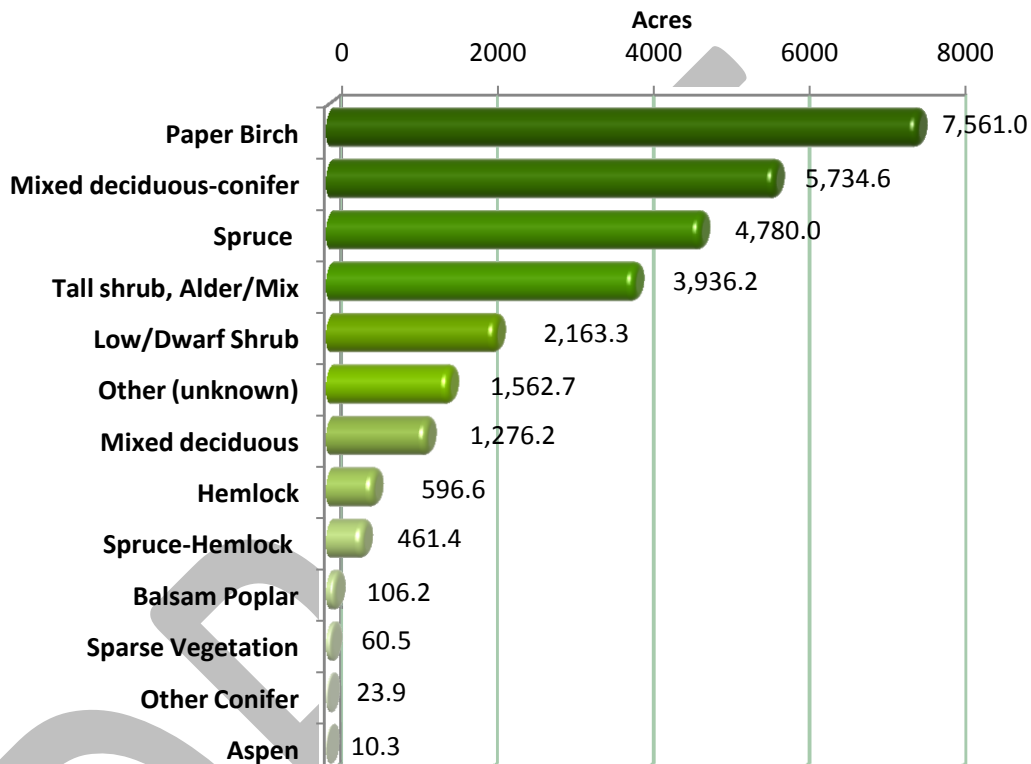


Figure 18. Eagle River/Chugiak canopy composition by genus (MOA LC)

Table 8. Forest Composition: Eagle River/Chugiak (MOA LC)

Forest Composition - Eagle River/Chugiak	Acres	Canopy %
Evergreen/Conifer		
Black Spruce Complex: Woodland	248.51	0.88%
Black Spruce: Closed	235.77	0.83%
Black Spruce: Open	1519.07	5.37%
Black Spruce: Woodland	387.02	1.37%
Sitka Spruce: Closed	126.81	0.45%
White Spruce Complex: Open	146.42	0.52%
White Spruce Complex: Woodland	4.50	0.02%
White Spruce: Open	1751.05	5.66%
White Spruce: Woodland	282.98	1.00%
Spruce Complex: Open	76.04	0.27%
Spruce Complex: Woodland	1.83	0.01%
Spruce-Hemlock Complex: Closed	146.65	0.52%
Spruce-Hemlock: Closed	303.19	1.07%
Spruce-Hemlock: Open	11.53	0.04%
Mountain Hemlock Complex: Closed	80.85	0.29%
Mountain Hemlock: Closed	220.18	0.78%
Stunted Mountain Hemlock: Open	205.40	0.73%
West Hemlock Complex: Closed	10.42	0.04%
Western Hemlock: Closed	79.80	0.28%
Other Conifer: Woodland	23.87	0.08%
All Conifer	5861.88	20.73%
Deciduous/Hardwood		
Aspen: Woodland	10.30	0.04%
Balsam Poplar: Open	86.00	0.30%
Balsam Poplar: Woodland	20.15	0.07%
Paper Birch: Closed	6043.69	21.38%
Paper Birch: Open	1469.75	5.20%
Paper Birch: Woodland	47.56	0.17%
Tall shrub: Closed: Alder	2114.96	7.48%
Tall shrub: Closed: Mix	41.32	0.15%
Tall shrub: Open: Alder	217.89	0.77%
Tall shrub: Open: Mix	1562.06	5.52%
Mixed deciduous: Open	1242.15	4.39%
Mixed deciduous: Woodland	34.04	0.12%
All Deciduous	12889.87	45.59%
Mixed Deciduous/Conifer		
Mixed deciduous-conifer: Closed	2178.57	7.71%
Mixed deciduous-conifer: Open	3217.80	11.38%
Mixed deciduous-conifer: Woodland	338.21	1.20%
All Mixed Deciduous/Conifer	5734.59	20.28%
Shrub		
Dwarf Shrub	345.83	1.22%
Low shrub: Closed: Mix	99.35	0.35%
Low shrub: Open: Alder	3.99	0.01%
Low shrub: Open: Mix	1578.78	5.58%
Low shrub: Open: Willow	135.41	0.48%
All Shrub	2163.35	7.65%
All Sparse Vegetation	60.46	0.21%
Other (Unknown)	1562.72	5.53%
All Land Cover	28272.87	100.00%

Eagle River/Chugiak Tree Canopy Cover on State, Federal, Municipal, and Private Lands

Parcel ownership within Eagle River, Chugiak, and surrounding communities includes the following:

- **State-owned** (6,429 acres) with 3,299 acres of canopy and an average tree canopy cover of 51%.
- **Federal-owned** (1,138 acres) with 916 acres of canopy and an average tree canopy cover of 80%.
- **Municipal-owned** (3,871 acres) with 2,449 acres of canopy and an average tree canopy cover of 63%.
- **Private-owned** (10,729 acres) with 5,680 acres of canopy and an average tree canopy cover of 53%.

Eagle River/Chugiak Tree Canopy Cover by Land Use

Residential

The Eagle River/Chugiak boundary has 16 square miles of land zoned residential, including single-family and multi-family parcels. Residential parcels include a total of nine square miles of tree canopy cover for an overall average tree canopy cover of 55%.

Commercial

Commercial and Industrial zoned parcels within Eagle River/Chugiak total 660 acres, with 148 total acres of canopy cover and an average tree canopy cover of 22%.

Heritage Land Bank

HLB within the Eagle River/Chugiak boundaries includes 1,016 acres of land that may be designated for residential, commercial, industrial, open space, or recreational use. HLB parcels have a total of 869 acres of canopy and an average tree canopy cover of 86%.

Right-of-Way

Eagle River/Chugiak communities include an estimated 3,839 acres of ROW with 946 acres of total tree canopy cover and an average tree canopy cover of 25%.

Recreational and Open Space

The Eagle River/Chugiak boundary includes 88 linear miles of trails and 529 acres of trail corridor (25 feet OC). Trail corridors include an estimated 213 acres of canopy and an average tree canopy cover of 40%.

Within the communities of Eagle River and Chugiak, there are 2,601 acres of parks, greenbelts, and open space (Table 10) (Appendix C) including:

- Four (4) parks greater than 100 acres each (Table 9). Beach Lake Park is the largest municipal park in the area, occupying 1,580 acres, with 775 acres of canopy and 49% tree canopy cover.

- Fourteen (14) parks with tree canopy cover greater than 65% (Table 11). Mink Park Greenbelt has the highest tree canopy cover average of 97%.
- All parks (2,601 acres) have 1,553 acres of canopy and an average tree canopy cover of 60%.

Table 9. Eagle River/Chugiak tree canopy cover in parks >100 acres

Eagle River Parks >100 Acres	Canopy Acres	Total Acres	Canopy %
Beach Lake Park	775.44	1580.45	49.06%
Mirror Lake/Edmonds Lake Park	444.41	494.63	89.85%
Section 25	116.10	143.25	81.04%
All Other Parks	217.24	382.55	56.79%
Parks total	1553.19	2600.88	59.72%

Table 10. Eagle River/Chugiak tree canopy cover by Parks

Eagle River Parks with Canopy >65%	Canopy Acres	Total Acres	Canopy %
Mink Park - Greenbelt	1.30	1.33	97.28%
Eklund Park	0.24	0.24	97.06%
Lampert Park	0.61	0.66	92.70%
Ramsey Park	7.10	7.70	92.16%
Mirror Lake/Edmonds Lake Park	444.41	494.63	89.85%
Peters Creek Park	42.36	49.10	86.27%
South Fork Park	8.49	10.39	81.68%
Section 25	116.10	143.25	81.04%
Hysten Crest Park	34.40	44.92	76.58%
Lower Fire Lake Island Park	0.75	1.01	74.70%
Mountain Ash Park	0.05	0.07	73.75%
New Glenn Hwy Buffer Park	0.56	0.79	70.55%
Homestead Park	0.99	1.44	68.90%
Mouth of Peters Creek Park	14.86	21.81	68.13%
All Other Parks	880.98	1823.53	48.31%
Parks total	1553.19	2600.88	59.72%

Eagle River/Chugiak Tree Canopy Cover by Comparison

A comparison of average tree canopy cover by a variety of land use and parcel ownership designations within Eagle River and Chugiak communities illustrates the relationship of tree canopy cover to use. HLB parcels have the greatest average tree canopy cover (86%), followed by federal-owned parcels (80%), and municipal parcels (63%). The lowest average tree canopy cover (22%) is on land zoned for commercial and/or industrial use (Figure 19).

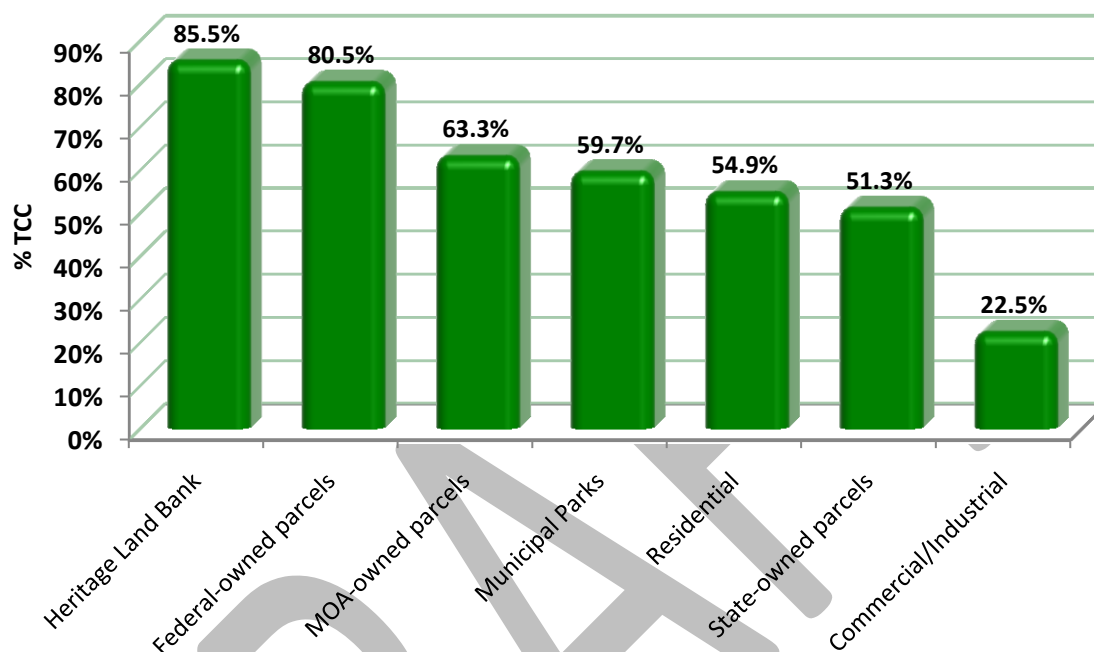


Figure 19. Comparison of percentage of tree canopy cover for a variety of land use and parcel ownership types within Eagle River/Chugiak communities.

Eagle River Tree Canopy Cover of Lakes, Rivers, and Streams

Using a 25-foot buffer on lake borders and a 70-foot-wide corridor to buffer streams, the analysis identified a total hydrologic buffer zone of 1,252 acres, including 389 acres of canopy for an average tree canopy cover of 31%.

Girdwood Tree Canopy Cover

The community of Girdwood (Figure 20) encompasses an area of 39 square miles within the overall MOA boundary (Figure 5). Land area within Girdwood includes seven square miles of land that does not have the potential to support canopy including five square miles of bare rock, sand, and clay; and two square miles of perennial ice and snowcap, leaving 32 square miles of land with the potential to support canopy cover. The analysis identified 14 square miles of tree canopy cover, including trees and woody shrubs, and an overall tree canopy cover of 42%.

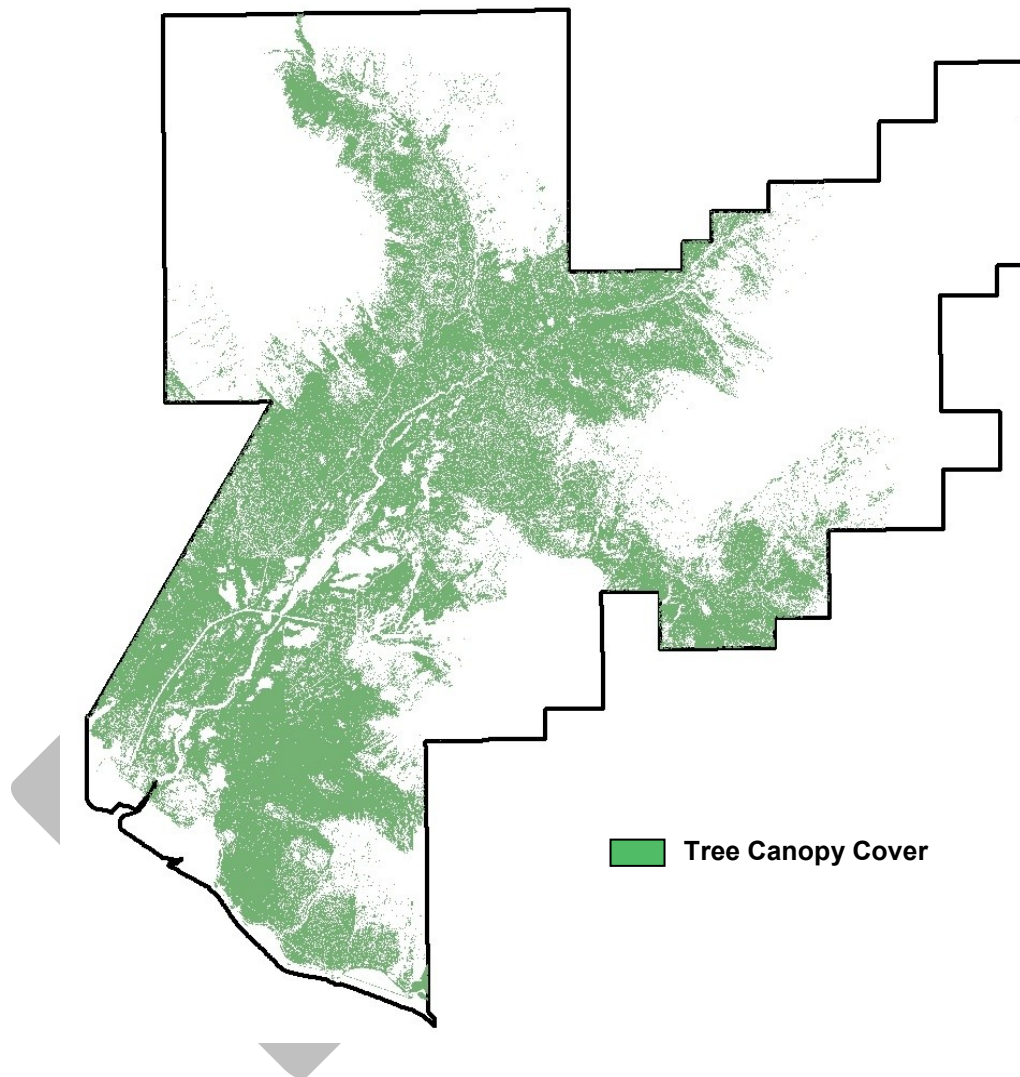


Figure 20. Girdwood boundary illustrating location and extent of tree canopy cover

Girdwood Tree Canopy Composition

Based on MOA land cover layer (30 x 30-meter resolution), 57% (4,900 acres) of the overall tree canopy cover (8,629 acres) is composed of forests that are predominantly conifer, followed by 20% (1,697 acres) of deciduous (hardwood) forests, and 7% (610 acres) of mixed conifer-deciduous forests. Nine percent (800 acres) of the canopy is composed of other or unidentified (unknown) species. The remaining 14% (623 acres) is predominately shrub and sparse vegetation cover (Figure 21).

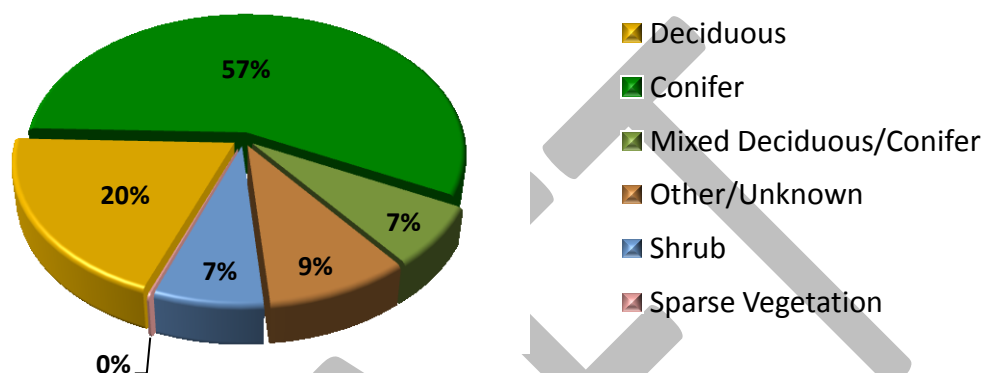


Figure 21. Girdwood forest type composition (Source MOA LC)

Table 11. Girdwood species composition MOA LC)

Species - Girdwood	Canopy Acres	Canopy %
Spruce-Hemlock	1794.91	20.80%
Tall Shrub, Alder/Mix	1069.23	12.39%
Sitka Spruce	970.36	11.24%
Western Hemlock	852.70	9.88%
Other (Unknown)	799.65	9.27%
Black Spruce	681.26	7.89%
Mixed Deciduous-Conifer	609.61	7.06%
Paper Birch	537.03	6.22%
Mountain Hemlock	480.44	5.57%
Low Shrub	467.38	5.42%
Dwarf Shrub	142.70	1.65%
White Spruce	97.01	1.12%
Mixed Deciduous	82.98	0.96%
Spruce	15.27	0.18%
Sparse Vegetation	13.23	0.15%
Other Conifer	7.79	0.09%
Aspen	7.75	0.09%
Total Canopy	8629.29	100%

A mixed forest of spruce (*Picea* spp.) and hemlock (*Tsuga* spp.) accounts for 1,795 acres (21%) of the overall forest composition in Girdwood. Spruce (*Picea* spp.) forests account for 1,764 acres (20%), including 970 acres (11% of overall tree canopy cover) of Sitka spruce (*Picea sitchensis*), 681 acres (8%) black spruce (*Picea mariana*), and 97 acres (1%) white spruce (*Picea*

glauca). Hemlock (*Tsuga* spp.) forests account for 1,333 acres (16%), including 853 acres (10% of overall tree canopy cover) of western hemlock (*Tsuga heterophylla*), and 480 acres (6%) mountain hemlock (*Tsuga mertensiana*) (Figure 22) (Table 11).

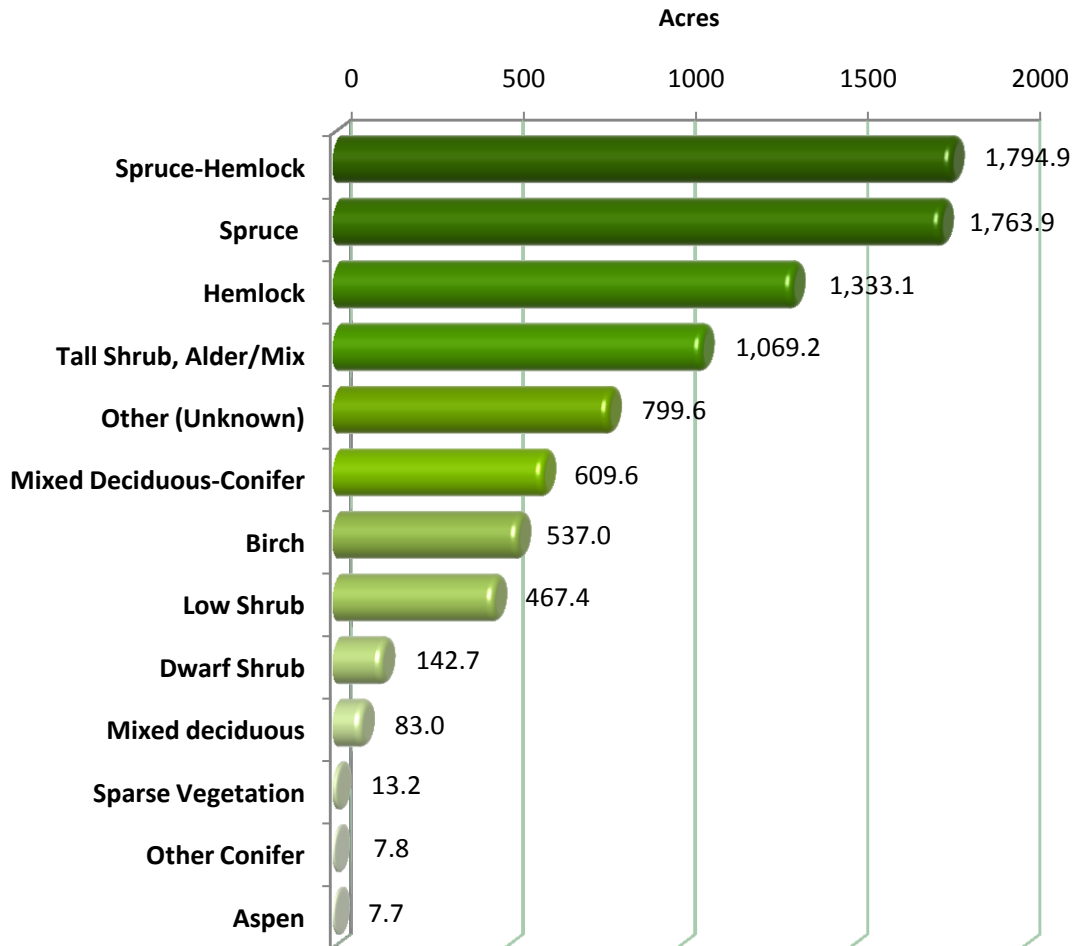


Figure 22. Girdwood canopy composition by genus (MOA LC).

Table 12. Forest Composition: Girdwood (MOA LC)

Forest Composition - Girdwood	Acres	Canopy %
Evergreen/Conifer		
Black Spruce Complex: Woodland	7.99	0.09%
Black Spruce: Closed	223.85	2.59%
Black Spruce: Open	404.05	4.68%
Black Spruce: Woodland	45.37	0.53%
Sitka Spruce: Closed	970.36	11.24%
White Spruce Complex: Open	6.12	0.07%
White Spruce: Open	76.70	0.89%
White Spruce: Woodland	14.19	0.16%
Spruce Complex: Open	15.27	0.18%
Spruce-Hemlock Complex: Closed	75.26	0.87%
Spruce-Hemlock: Closed	1709.75	19.81%
Spruce-Hemlock: Open	9.90	0.11%
Mountain Hemlock Complex: Closed	63.99	0.74%
Mountain Hemlock: Closed	230.41	2.67%
Stunted Mountain Hemlock: Open	186.05	2.16%
West Hemlock Complex: Closed	156.33	1.81%
Western Hemlock: Closed	696.37	8.07%
Other Conifer: Woodland	7.79	0.09%
All Conifer	4899.73	56.78%
Deciduous/Hardwood		
Aspen: Woodland	7.75	0.09%
Paper Birch: Closed	425.35	4.93%
Paper Birch: Open	76.66	0.89%
Paper Birch: Woodland	35.02	0.41%
Tall shrub: Closed: Alder	719.25	8.34%
Tall shrub: Open: Alder	82.04	0.95%
Tall shrub: Open: Mix	267.94	3.11%
Mixed deciduous: Open	82.98	0.96%
All Deciduous	1696.99	19.67%
Mixed Deciduous/Conifer		
Mixed deciduous-conifer: Closed	328.11	3.80%
Mixed deciduous-conifer: Open	236.33	2.74%
Mixed deciduous-conifer: Woodland	45.16	0.52%
All Mixed Deciduous-Conifer	609.61	7.06%
Shrub		
Dwarf Shrub	142.70	1.65%
Low shrub: Closed: Mix	44.27	0.51%
Low shrub: Open: Mix	387.58	4.49%
Low shrub: Open: Willow	35.53	0.41%
All Shrub	610.08	7.07%
Sparse Vegetation	13.23	0.15%
Other (Unknown)	799.65	9.27%
All Land Cover	8629.2870	100.00%

Girdwood Tree Canopy Cover on State, Federal, and Municipal Lands

Within the Girdwood community, there are 2,631.5 acres (4.1 square miles) of state-owned parcels with 689 acres of tree canopy cover and an average tree canopy cover of 26.2%. Federal government owns 3,461.5 acres with 753.9 acres of tree canopy cover and an average tree canopy cover of 21.8%. Municipal-owned parcels within Girdwood total 10.2 square miles (6,553.5 acres) and include 6.7 miles² (4,299.9 acres) of tree canopy cover, for an average tree canopy cover of 65.6%.

Girdwood Tree Canopy Cover by Land Use

Residential

Residential parcels in Girdwood are not identified in MOA GIS land use layers.

Commercial

Commercial parcels in Girdwood are not identified in MOA GIS land use layers.

Heritage Land Bank

Heritage Land Bank (HLB) is municipal land currently uncommitted and held in reserve for future use, including lands transferred to the Municipality from the State of Alaska under the Municipal Entitlement Act. HLB in Girdwood covers 6,435.4 acres (10.1 square miles) of land that may be designated for residential, commercial, industrial, open space, or recreational use. HLB parcels have a total of 4,219 acres (6.6 square miles) of canopy, and an average tree canopy cover of 65.6%

Right-of-Way

Girdwood includes an estimated 408.7 acres (0.6 square miles) of ROW with 159.6 acres of total tree canopy cover and an average tree canopy cover of 39.1%.

Trails

Girdwood has 35.3 miles of trails. To assess tree canopy cover along the trail system, the study assigned a 25-foot buffer from the trail centerline and assessed all canopy cover within the resulting 50-foot corridor. Based on this methodology, Girdwood has 216 acres of trail corridor, with 133.4 acres of canopy for an average tree canopy cover of 61.7%.

Recreational and Open Space

Girdwood has ten parks, covering 140.1 acres, with an overall tree canopy cover of 63.4 acres and an average tree canopy cover of 45.3%. Girdwood Town Square Park (0.78 acres) has the greatest overall tree canopy cover of 94.8% (0.74 acres), followed by Banff Park (1.9 acres) with 1.7 acres of canopy and an average tree canopy cover of 94.2%, and Girdwood Town Square Buffer Park (0.84 acres) with 0.73 acres of canopy and an average tree canopy cover of 86.4% (Table 13).

Table 13. Girdwood tree canopy cover by parks

Girdwood Parks	Canopy (Acres)	Total Acres	Canopy %
Girdwood Town Square Park	0.74	0.78	94.79%
Banff Park	1.74	1.85	94.22%
Girdwood Town Square Buffer Park	0.73	0.84	86.35%
Alpine Park	1.79	2.08	86.16%
Alyeska Basin Park	2.50	3.01	82.90%
California Creek Park	9.94	12.52	79.36%
Girdwood Lions Park	0.66	0.86	76.81%
Alyeska Basin Park Reserves	11.24	18.66	60.23%
Girdwood Park	3.74	7.17	52.12%
Moose Meadow Park	30.37	92.30	32.91%
Parks Total	63.43	140.06	45.29%

Girdwood Tree Canopy Cover by Comparison

A comparison of average tree canopy cover by a variety of land use and parcel ownership designations within Girdwood illustrates the relationship of tree canopy cover to use. Municipal-owned and HLB parcels have the greatest average tree canopy cover (65.6%), followed by state-owned parcels (26.2%). The lowest average tree canopy cover (21.8%) is on federal-owned parcels (Figure 23).

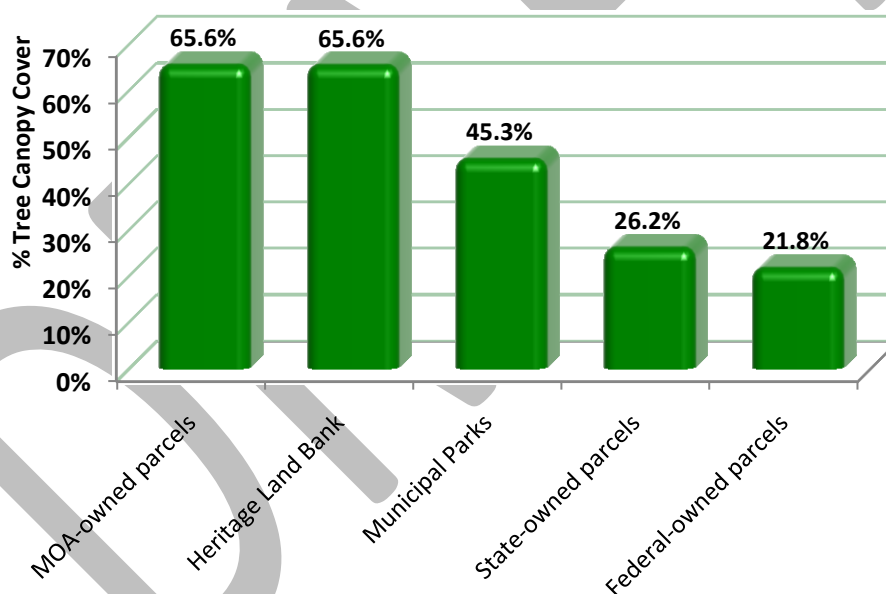


Figure 23. Comparison of percentage of tree canopy cover for a variety of land use and parcel ownership types within Girdwood

Girdwood Tree Canopy Cover of Rivers and Streams

Municipal GIS layers identify a centerline for rivers and streams. To assess canopy cover bordering rivers and streams, the study assigned a 35-foot buffer from the centerline for an overall stream corridor width of 70 feet. Using this methodology, the analysis identified 753.3 acres of hydrologic buffer zones bordering streams within Girdwood. The assessment identified 301.2 acres of canopy within these zones for an overall total tree canopy cover of 61.7%.

Benefits from Anchorage's Forests

Anchorage forestlands are working 24/7 to provide environmental benefits vital to the health, well-being, and sustainability of the community and the region's wildlife. While a complete quantification of those benefits was not within the scope of this project, sample inventories were collected by state forestry personnel and analyzed by DRG using i-Tree *Streets* to quantify the environmental benefits per acre provided by two different representative forest types. A 0.5-acre sample of paper birch (deciduous) forest was collected at Campbell Creek, and a 0.2-acre sample of mixed (conifer/deciduous) forest was collected at Russian Jack Springs Park. These sample inventories were analyzed for the following:

- Forest structure, including species composition, relative age distribution, condition, and replacement value.
- Environmental benefits provided, including air quality, water quality, and reduction of atmospheric carbon dioxide (CO₂).

A detailed report of this analysis can be found in Chapter 3. The results of these two case studies along with MOA land cover and NLCD species composition information may be used to make some broad estimation regarding the overall benefits provided by Anchorage forestlands.

Air Quality

Air quality, especially in the bowl, is an important environmental issue in Anchorage. During winter months, tons of sand are spread on roads to aid in traction. While road crews clean up the sand in the spring, there is a period of time when the roadways become dry and significant dust is stirred into the air by vehicle traffic and winds. These dust particles hang visibly in the air, creating poor air quality conditions throughout the community. In addition to road dust, vehicle and power generating emissions and wood burning contribute to harmful particulates that float in the air and can be inhaled by people. A recent study released by the state Department of Health and Social Services (August 2010) revealed a correlation between poor air quality (specifically particulate matter) and hospital visits for heart disease, stroke, and respiratory illness in Fairbanks over a five-year period.

Trees and forests protect and improve air quality in Anchorage by intercepting particulate matter (PM₁₀), including dust as well as ash, pollen, and smoke. Particulates are filtered and held in the tree canopy where they are eventually washed harmlessly to the ground. Forests increase oxygen levels as a product of photosynthesis and absorb harmful gaseous pollutants like ozone (O₃), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂) through both needle and broadleaf surfaces. In addition, scientists are finding that some trees may absorb more volatile organic compounds (VOC's) than previously thought (Karl, T. et al; Science NOW). VOC's are a class of carbon-based particles emitted from automobile exhaust, lawnmowers, and other human activities.

The paper birch (deciduous) forest sample collected at Campbell Creek is annually removing more than 60 pounds of nitrogen dioxide (NO₂), particulate matter (PM₁₀), sulfur dioxide (SO₂), and ozone (O₃) per acre for a net air quality benefit valued at approximately \$90 per acre. Twenty-five percent (25%) of overall Anchorage forestlands are composed of deciduous forests and 8% (31,077 acres) are paper birch forests.

The mixed (conifer/deciduous) forest sample collected at Russian Jack Springs is annually removing 80 pounds of NO₂, PM₁₀, SO₂, and O₃ per acre. Eight percent (31,045 acres) of Anchorage forestlands are composed of mixed forests.

Water Quality

According to Federal Clean Water Act regulations, municipalities must obtain a permit for managing their stormwater discharges into water bodies. Each city's program must identify the *best management practices* (BMPs) it will implement to reduce its pollutant discharge. Many communities, including Seattle and Portland, are turning to trees to solve their stormwater issues in a less costly and more sustainable manner.

Trees and forests intercept rainfall in their canopy, which act as mini-reservoirs. During storm events, this interception reduces and slows runoff. Tree canopy lessens the impact of raindrops on barren soils. Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and snowmelt. These processes greatly reduce the flow and volume of runoff, avoiding erosion and preventing sediments from entering streams, lakes, and inlets.

Preserving natural forest stands and minimizing the footprint of impervious structures before, during, and after development can reduce runoff from urban and suburban properties and effectively solve many stormwater issues before they become costly and/or detrimental to the surrounding environment. Engineered and natural stormwater systems that incorporate and take advantage of the natural benefits provided by trees and forests are proving to be more cost-effective and sustainable than traditional detention and treatment methods.

The paper birch (deciduous) forest sample collected at Campbell Creek is annually intercepting approximately 304,800 gallons of stormwater per acre, valued at \$3,292. The mixed (conifer/deciduous) forest sample collected at Russian Jack Springs Park is annually intercepting 544,561 gallons of stormwater per acre, valued at \$5,882.

Carbon

Trees and forests reduce atmospheric carbon dioxide (CO₂) through growth and the sequestration of CO₂ as woody and foliar biomass. Anchorage's extensive forests are providing a significant reduction in atmospheric carbon dioxide (CO₂) for a positive environmental and financial benefit to the community.

As environmental awareness continues to increase, governments and individuals are paying particular attention to climate change and the effects of greenhouse gas emissions. Two national policy options are currently under debate, the establishment of a carbon tax and a greenhouse gas cap-and-trade system, aimed at the reduction of atmospheric carbon dioxide (CO₂) and other greenhouse gases. A carbon tax would place a tax burden on each unit of greenhouse gas emission and would require regulated entities to pay for their level of emissions. Alternatively, in a cap-and-trade system, an upper limit (or cap) is placed on global (federal, regional, or other jurisdiction) levels of greenhouse gas emissions and the regulated entities would be required to either reduce emissions to required limits or purchase emissions allowances in order to meet the cap (Williams and others, 2007). The concept of purchasing emission allowances (offsets) has led to the acceptance of carbon credits as a commodity that can be exchanged for financial gain. The Center for Urban Forest Research (Pacific Southwest Research Station, and USDA Forest Service) recently led the development of Urban Forest Project Reporting Protocol. The protocol incorporates methods of the Kyoto Protocol and Voluntary Carbon Standard and establishes methods for calculating reductions, provides guidance for accounting and reporting, and guides urban forest managers in developing tree planting and stewardship projects that could be registered for greenhouse gas reduction credits (offsets). The protocol can be applied to urban tree planting projects within municipalities, educational campuses, and utility service areas anywhere in the US.

To date, the paper birch (deciduous) forest sample collected at Campbell Creek has sequestered approximately 289 tons of CO₂ per acre (\$4,280). Annually, this tree stand is reducing (sequestering) more than 19 tons per acre, valued at \$292. The mixed forest sample collected at Russian Jack Springs Park has sequestered 345 tons of CO₂ per acre (\$5,205) to date and continues to annually reduce CO₂ by 31 tons per acre, valued at \$465.

Aesthetics and Socioeconomics

The stunning, natural beauty of the wilderness that surrounds and defines Anchorage living is unique and unsurpassed and forests are an integral part of that beauty. Individual trees, forests, and unique landscape views increase property values and contribute to the psychological health of residents and visitors. While some of the benefits of forests are intangible and/or difficult to quantify, such as impacts on psychological health, crime, and violence, empirical evidence of these benefits does exist (Kaplan 1989; Ulrich 1986). But there is limited knowledge about the physical processes at work and their interactions make quantification imprecise. Exposure to nature, including trees, has a healthy impact on humans, including increased worker productivity, higher test scores, reduced symptoms of ADD, and faster recovery times following surgery. In addition, trees and forests have positive economic benefits for retailers. There is documented evidence that trees promote better business by stimulating more frequent and extended shopping and a willingness to pay more for goods and parking (Wolf, 2007).

Wildlife

Wildlife is a natural part of living in Anchorage. Black and brown bears, wolves, Dall sheep, beaver, and a large population of moose are just a few of the 52 mammals that live within the municipal boundaries. Besides mammals, Anchorage is home to five species of salmon and 230 bird species. Marine mammals, including beluga whale, are present in Cook Inlet. While living in close proximity to all this wildlife does pose challenges and even some danger, a recent poll conducted by the Alaska Department of Fish and Game (2010) found that most residents take pride in the wildlife and believe, “they make life in Anchorage more interesting and special.”

Threats to forest health are also a direct threat to Anchorage’s wildlife. Forests provide critical wildlife habitat for foraging, denning, and nesting, as well as protecting vital water resources and salmon spawning grounds. Trees and forests are essential to the health and sustainability of the environment. As the foundation of the production food chain, forests are providing vital ecosystem services and supporting healthy wildlife populations.

Anchorage’s dramatic growth has already resulted in significant loss of open space and wildlife habitat. Forests have been reduced and riparian corridors have been degraded by development and pollution. Reduction, fragmentation, and degradation of natural habitat affect wildlife population levels, behavior, and relationships. More than half of the area’s wetlands have been lost to development since the 1950s. As a result, wildlife populations dependent upon freshwater wetlands (loons, cranes, etc.) have decreased, while populations of exotic species such as pigeons and starlings have increased, creating issues of competition and disease spread among native bird species (ADF&G, 2000).

In *Living with Wildlife in Anchorage: A Cooperative Planning Effort*, the Alaska Department of Fish and Game suggests that “a plan is needed to identify and protect the important habitat that remains, including tracts of undeveloped natural areas and corridors that link them.” (2000) Forest management should compliment these efforts with provisions to preserve lands identified for protection as important wildlife habitat.

Recreation

Regardless of the season, outdoor recreation is an important part of life to the residents and visitors of Anchorage. With more than 700 miles of trails (120 paved) and 1,131 square miles of forested parks and open space, that comes as no surprise. Fishing, boating, kayaking, cycling, and wilderness hiking are only a few of the myriad activities available for passing time on those endless summer days. In winter months, ice and snow add even more opportunities for fun including ice skating, downhill skiing, sledding, snow machining, snow shoeing, and skiing or skijoring cross-country on 200 miles of maintained trails. Winter is also the time for engaging in the official state sport—dog sledding. Dog sled teams train on their own dedicated trail system. Both the Iditarod and the World Championship Sled Dog Races begin in downtown Anchorage. All of these activities are enhanced by the trees and forests that provide a unique backdrop and unlimited opportunities for the pursuit of leisure.

Stakeholder Sentiment – Public Survey

In conjunction with the forest assessment, DRG worked with municipal and state forest managers to develop an online survey as a means to involve stakeholders in the assessment and planning process. The survey was intended to help us to better understand how Anchorage residents view the forest as well as to identify which forest benefits and services are believed to be most important. The survey was available for six weeks beginning June 1, 2010 through July 12. Notice of the survey was sent to a diverse range of stakeholders, including general contractors, architects, realtors, legislators, planners, retail and service organizations, various user groups, non-profits, and land and resource managers (Appendix D).

A total of 953 individuals responded to the survey and 894 (94%) completed all 16 questions. Sixty-two percent (62%) of respondents were female and 38% were male (Question #1). Thirty-four percent (34%) of respondents were age 56 or older, 31% were age 46 to 55, 17% were age 36 to 45, 15% were age 26 to 35, 3% were age 18 to 25, and less than 1% was younger than 18 years (Question #2). The majority of respondents were residents of Anchorage (86%), followed by 7% from Eagle River, 3% from Chugiak, and 1% from Girdwood. Four percent (4%) of respondents reside outside of the Municipality, including Big Lake, California, Fairbanks, Homer, Nome, Palmer, and Wasilla (Question #3). A complete list of comments received from respondents is included in Appendix D, sorted by question.

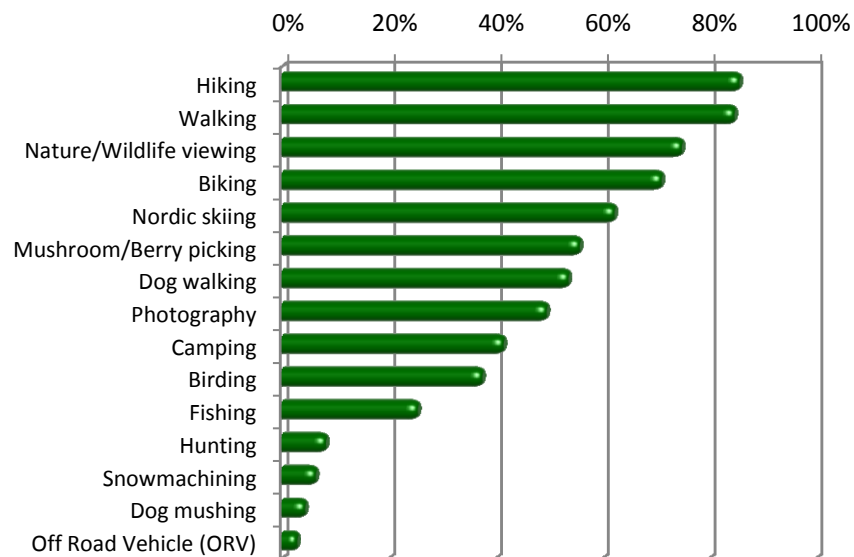
The survey results are summarized as follows:

Activities Enjoyed in Anchorage Forestlands

All 953 participants responded to the request to, “*Please select the activities you enjoy in Anchorage’s forestlands (choose all that apply).*” (Question #4). The most popular activity enjoyed in Anchorage forestlands by survey respondents is hiking (86%), followed by walking (85%), nature/wildlife viewing (75%), and biking (71%) (Figure 24).

Sixteen percent (16%) enjoy activities not listed in the survey, including trail/cross-country running (7%), snowshoeing (3%), geocaching/orienteering (2%), as well as skijoring, boating/kayaking, archery/shooting, hunting, art, backpacking, and cultural activities.

Figure 24. Activities enjoyed in Anchorage forestlands by respondents to online survey



Value of Benefits Provided by Anchorage's Forests

To better understand which forest benefits are most important to residents and other stakeholders, respondents were asked to respond to the statement, “Anchorage’s forests provide many benefits and services that support the quality of life in our communities. Please rate the value of the following services to you.” Of the 921 individuals who responded to this question (#5), 98% believe that air quality, water quality, and recreation are important or very important, followed by wildlife habitat and beauty/aesthetics (each 97%), and attractive to tourists (79%) (Figure 25).

Eighty-five percent (85%) of respondents believe that water quality is a very important benefit provided by Anchorage’s forests, followed by air quality (82%), wildlife habitat (81%), and recreation (77%). Nineteen percent (19%) of respondents indicated that benefits other than those listed were very important, including overall quality of life and health benefits (5%), privacy and noise buffering (2%), as well as benefits to the natural environment, temperature/climate buffering, and spiritual/cultural benefits (1% each). Seventy-two percent (72%) of residents believe that firewood is not an important benefit.

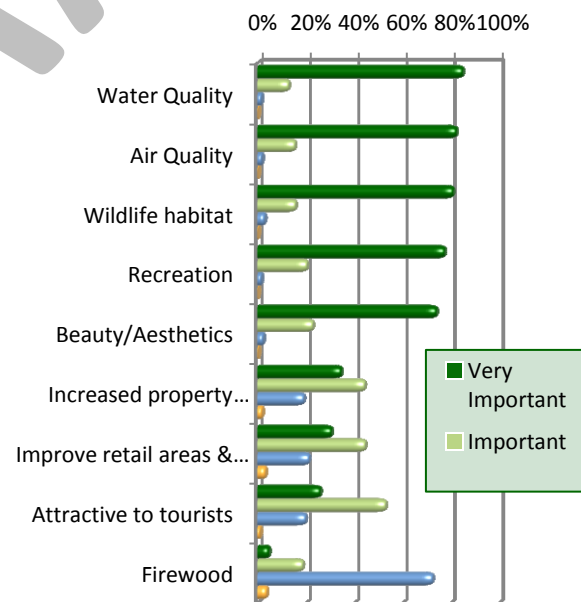


Figure 25. Importance of benefits provided by Anchorage’s forests.

Comparative Value of Forests and Parks to Other Public Services and Amenities

Intended to gain perspective on how residents and stakeholders view Anchorage forestlands in relation to other public assets and services, survey respondents were asked to respond to the statement, “*Management and maintenance of any resource requires community support. Please tell us how you view the value of the following public services and amenities.*” Each amenity or service was rated separately by the 921 individuals who responded to this question (#6) so that respondents were not forced to rate one amenity over another. Ninety-eight percent (98%) of respondents believe that public safety along with parks, trails, and forests are important or very important public services/amenities, followed by schools (96%), health/social services (93%) and roads (91%) (Figure 26).

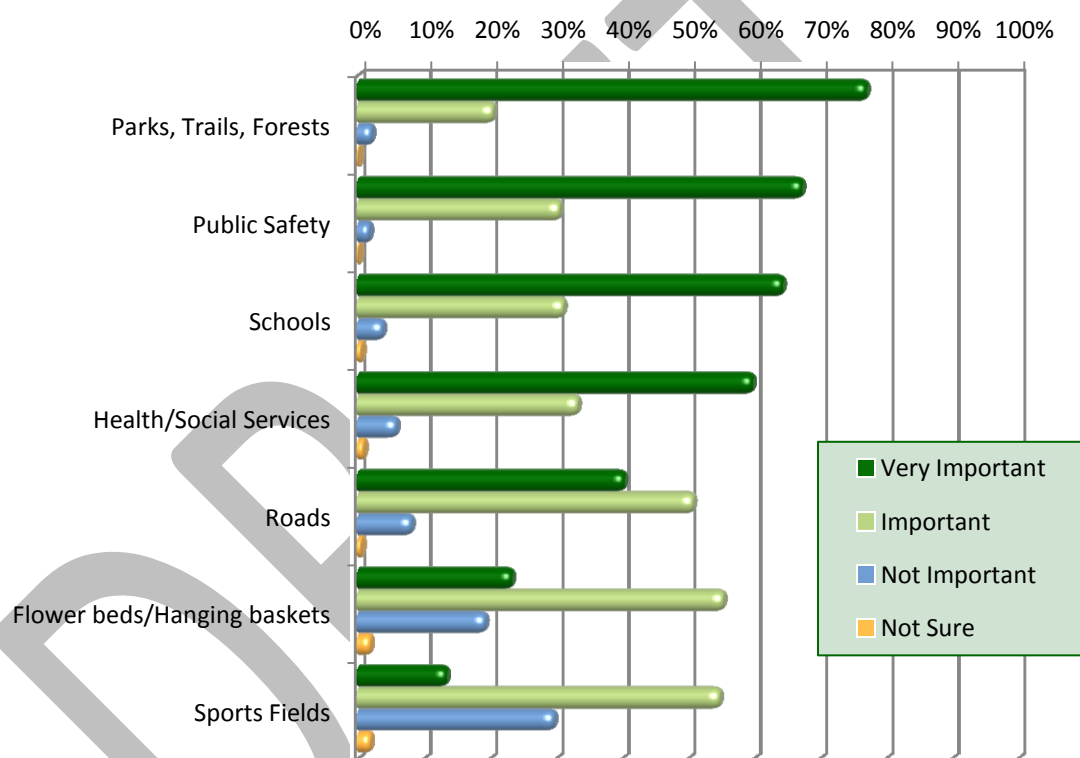


Figure 26. Comparative value of forests and parks to other public services and amenities.

Seventy-seven percent (77%) of respondents believe that parks, trails, and forests are very important public services/amenities, followed by public safety (67%), schools (64%), and health/social services (60%). Of the public services and amenities listed in the survey, sports fields were the least important amenity supported by the community. While 55% of respondents believe sports fields are important, 30% believe they are not important, 2% are unsure, and only 14% believe they are very important.

Public Concern for Threats Facing Anchorage's Forestlands

To determine public awareness of threats facing Anchorage's forestlands, survey respondents were asked to respond to the statement, *"Like forests everywhere, Anchorage's forests face multiple threats to health, safety, and sustainability. Please rate your concern for the following threats."* Of the 921 individuals who responded to this question (#7), 92% are somewhat or very concerned about development as a threat to Anchorage forestlands, followed by a lack of management funds (92%), and invasive pests (92%) (Figure 27).

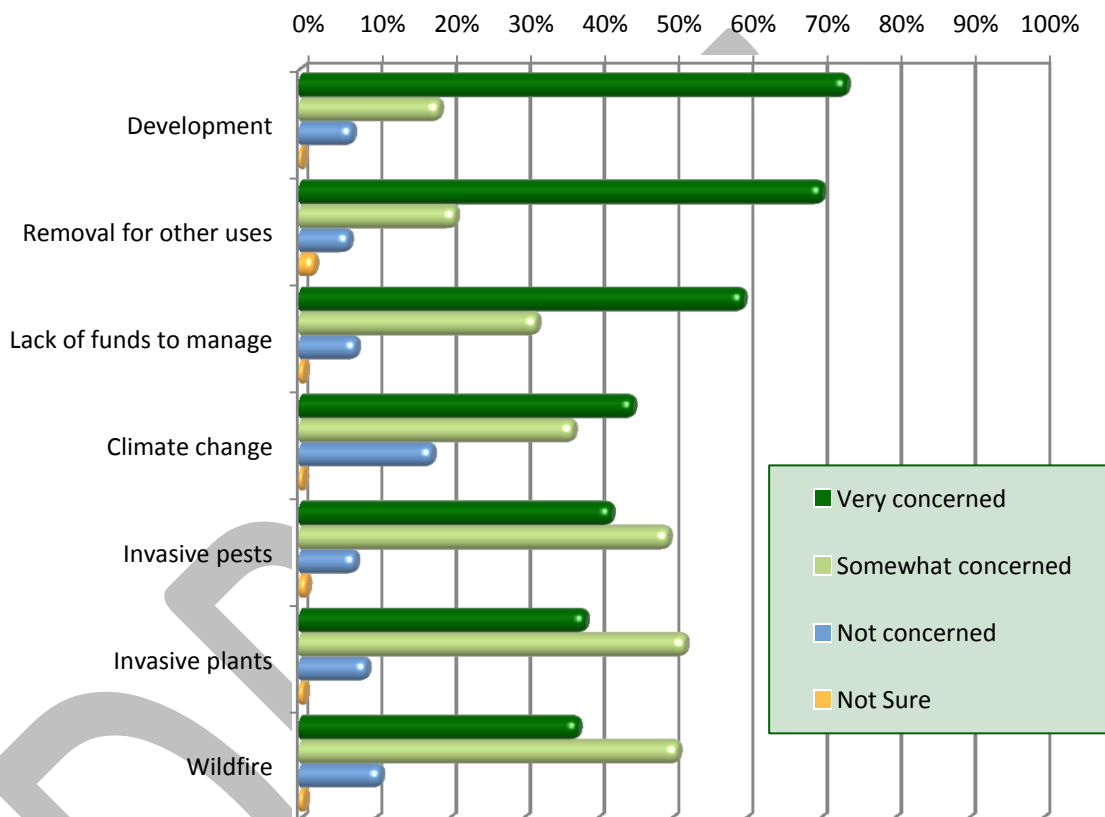


Figure 27. Public concern for threats facing Anchorage's forestlands

Seventy-four percent (74%) of respondents are very concerned at the threat of development to Anchorage's forestlands, followed by the threat of the removal of forests for other uses (70%), and a lack of management funding (60%). Overall, respondents are least concerned with the threat of climate change, with 164 (18%) stating they are not concerned with this threat. Seven percent (7%) of respondents were very concerned about threats not listed in the survey, including homeless camps and vandalism (1%), too many users, forest fragmentation, and apathy.

Public Views Regarding Anchorage Forestland

In questions 8 through 15, survey participants were asked to respond to a series of questions by selecting *Agree*, *Disagree*, or *Not Sure*. Of the 894 individuals who responded to each of the questions, most (97%) were in agreement with the statement that “*Forests are important to the quality of life in Anchorage,*” followed by the statement, “*A healthy forest is essential to the health and well-being of Anchorage communities,*” (95%) and, “*Preservation and restoration of forestlands should be considered during future development in Anchorage.*” (94%) (Figure 28).

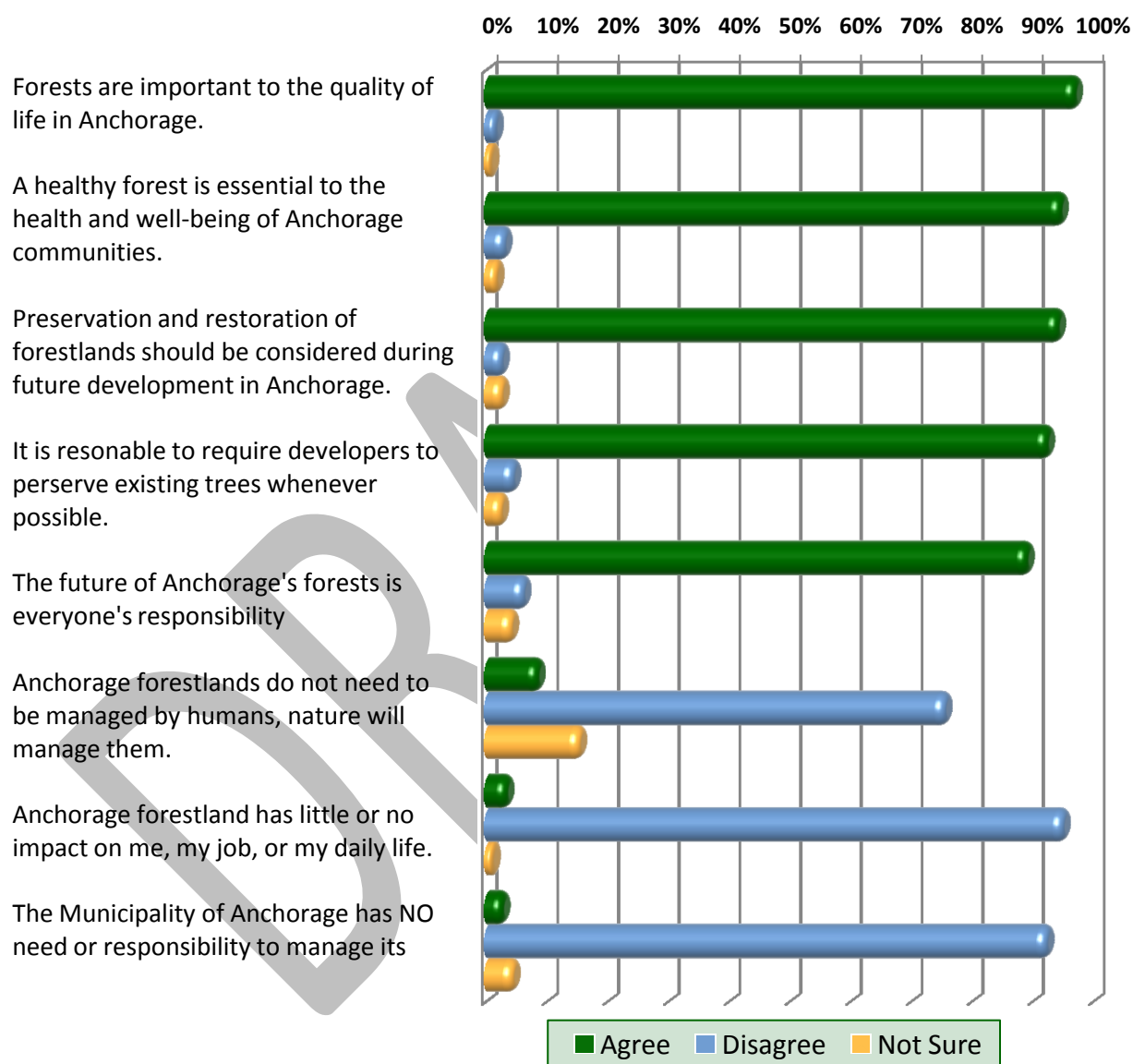


Figure 28. Public views regarding statements about Anchorage forestlands

Respondents were in most disagreement (95%) with the statement, “*Anchorage forestland has little or no impact on me, my job, or my daily life,*” and most unsure about the statement, “*Anchorage forestlands do not need to be managed by humans, nature will manage them.*”

Public Willingness to Fund Forestland Management

Intended to determine the willingness of residents and other stakeholders to fund forestland management activities, four options for funding were proposed in the final question (#16) and respondents were asked to respond to the statement, “*Managing forestlands requires funding for trails, fire protection, hazard tree removal, restoration, and other maintenance measures.*” Please rate your support of the following options to fund forest management and restoration.” Of the 894 respondents, 92% might or would definitely support development fees as a funding source for forestland management, followed by donations to the park fund (92%), and \$10 a year added to property taxes (85%) (Figure 29).

Twelve percent (12%) of respondents suggested other funding sources that they would definitely support including other taxes or fees (4%), user fees or an annual pass (2%), volunteer maintenance (2%), donations or fundraisers for specific goals/facilities (1%), and the addition of a forestland management checkbox for dividend funds.

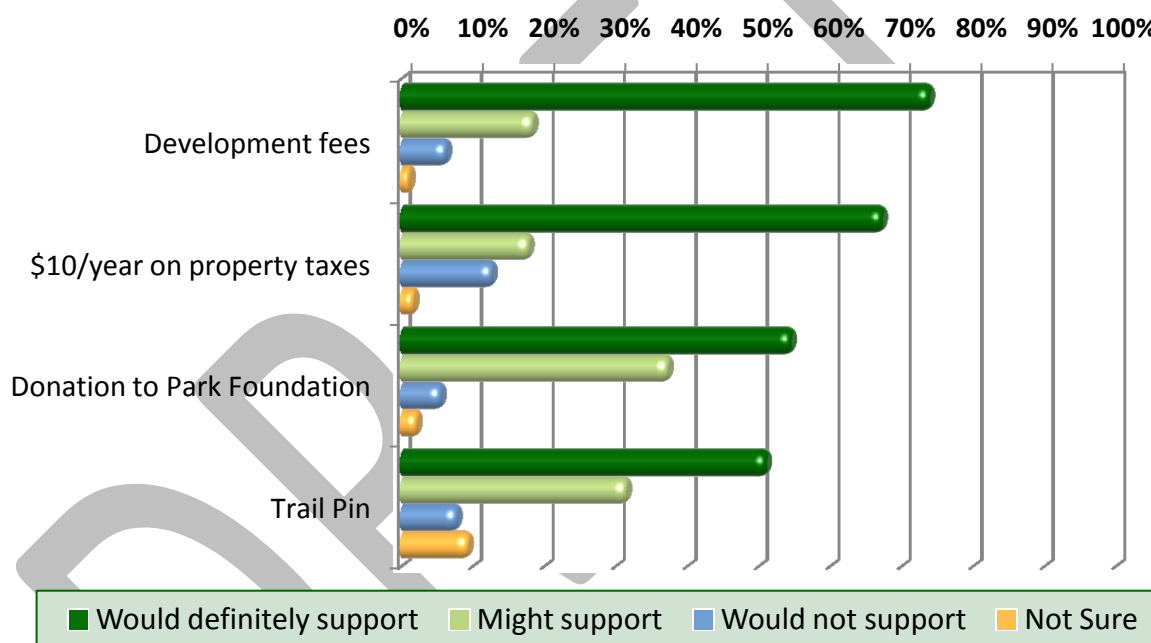


Figure 29. Public willingness to fund forestland management

At the end of the public survey, respondents were invited to enter additional comments or concerns regarding the survey and/or the forestland assessment and management plan process. More than 225 additional comments were received. The results of the survey as well as all comments (Appendix D) were reviewed and considered in the forestland assessment and in the development of the Anchorage Forestland Management Plan.

Threats to Anchorage Forests

Wildfire

Wildfire is part of the natural cycle and all forests are at risk. Anchorage has not experienced a large wildland fire since 1973. There have, however, been several significant fires in the past number of years, including the 50-acre Otter Lake Fire in 2006 (CWPP, 2008), and the risk of

wildfire is high due to the large number of dead trees killed by spruce beetles. This type of fuel not only increases the risk of fire, but also the burn intensity and hinders the ability to conduct fire suppression in the event of a wildfire. Wildfires that threaten homes, property, and life are a serious issue.

Anchorage is designated as “urban wildland interface community” because it is “within the vicinity of federal lands that are at high risk of wildfire” (Federal Register 2001). In response, the Anchorage Fire Department (AFD) has completed a Municipality-wide Community Wildfire Protection Plan (CWPP) and has dedicated staff to implement the high-priority objectives of the plan. In addition, AFD is working with neighborhoods and community councils to develop specific CWPPs and action strategies to help residents prepare for wildland fire. AFD staff work to identify risk and hazard issues in wildland-urban interface (WUI) and develop hazard fuel mitigation plans. Hazard fuel reduction projects work to mitigate the risks and hazards of fire and treat forest fuels to limit the spread and intensity of wildland fire. Homes abutting forestlands, especially in steep terrain are at the higher risk. The CWPP emphasizes the development of defensible space, reducing fuel volume in the WUI, and developing hardwood corridors, which are more easily defended in support of fire suppression efforts.



Reducing fuel volumes and developing hardwood corridors facilitates fire suppression efforts in the event of a wildfire.

Development

One of the greatest risks to Anchorage forests is development. Since Alaska became the 49th state in 1959, the population in Anchorage has increased by nearly 234%. *Anchorage 2020: Anchorage Bowl Comprehensive Plan* anticipates that by 2020 the population will have grown to 365,700, a 32% increase over the current population. All this growth comes at a cost. Large tracts of forestland, open space, and more than half of pre-existing wetlands have been lost to development since 1950. Today, the average tree canopy cover in the bowl is 35%; this is below the 40% canopy goal recommended to ensure that a minimum threshold of green infrastructure is

maintained as urban areas continue to develop (American Forests). While it may not be possible to quantify the actual amount of wetland and forest acres lost to development, if you consider that the current tree canopy cover in Anchorage bowl municipal parks averages 68% and nearby Chugach State Park has an average tree canopy cover of 76%, it is reasonable to assume that, prior to development, the bowl had, at minimum, an average tree canopy cover of 65%. If this assumption is true, then nearly 34 square miles (21,713 acres) of forestland has already been lost within Anchorage bowl.

Anchorage forestland currently at high risk for development includes 17 square miles (11,129 acres) of Heritage Land Bank (HLB). HLB is municipal land that is currently uncommitted and held in reserve for future use, including lands transferred to the Municipality from the State of Alaska under the Municipal Entitlement Act. HLB land is held in the inventory for future municipal use, including public facilities, schools, parks, and open space. HLB is subject to disposal through land sales, land exchange, leases, easements, and temporary use permits. HLB parcels have a total of 11 square miles of canopy and an overall tree canopy cover of 63%.

Continued growth and development is both desirable and necessary to the economic well-being of the community. However, neglecting to provide adequate consideration to the preservation of trees and forests can be a costly oversight. Communities across the country are finding themselves in the position of reestablishing their urban forests after significant loss of canopy begins taking a toll on quality of life. Anchorage, as well as other Alaskan communities, has the enviable opportunity to avoid costly reforestation projects if current deforestation trends are slowed. Recognizing the vital function of trees and forests and adopting proactive preservation strategies is much more cost-effective than trying to rebuild a healthy, working urban forest.

To date, clear-cutting and grubbing over an entire development site has been a common practice. Forests are clear-cut to facilitate the construction of roads, homes, and commercial buildings. Irreplaceable wetlands are drained and filled. Grading and compaction destroy valuable top soil and soil structure and impervious surfaces alter hydrology, resulting in an increased flow of contaminants into creeks, rivers, lakes, and inlets. While these practices are often profitable and appear to be the quickest means to complete a construction project, the preservation and integration of significant trees and forest stands into development can often result in a more valuable and desirable finished product. Mature trees can add up to 25% to the value of property and trees and landscapes have a measurable positive effect on the buying habits of consumers in retail locations (Wolf, 2007).

With Anchorage's seemingly abundant forests, it's easy to believe that forestlands and the benefits they provide are eternal and self-sustaining. However, the truth is that an ever-expanding population and development have placed stress on this natural resource. While street trees and the preservation or restoration of scattered forest stands definitely provide benefits, the greatest benefits to both residents and wildlife are realized through the preservation of larger, contiguous forests. As Anchorage continues to grow and develop, preserving urban trees and natural forests is vital to sustaining the quality of life enjoyed and expected by the community. Preservation requires recognition of the value of forests and the environmental services they provide as well as a commitment to smart growth practices.

Mammals

Moose

Approximately 1,900 moose live within the municipal boundaries. Most moose live on state forest and national park lands in warmer seasons, but it is estimated that 200 to 300 live year-round in the bowl. During winter months, the moose population in the bowl swells to as many as 1,000. In spring and summer, moose graze on sedges, pond plants, and the leaves of willow and birch. It is during winter months, when snow covers the ground and deciduous shrubs are dormant, that moose cause the most destruction by consuming large quantities of willow, birch, and alder twigs. Moose forage young deciduous forest trees, eating terminal bud wood and limiting regrowth of large stature hardwoods. In urban areas, street and landscape trees are often severely damaged by browsing moose. In recent years, habitat in the bowl and in Fort Richardson has been heavily browsed (ADF&G, 2000). Increased species diversity and planting larger-growing species, along with protective fencing for newly planted and immature trees may reduce damage over time.

Beaver

Undeniably, beavers damage and kill individual trees in the forest by harvesting tree bark and falling timber for dam construction. Nevertheless, beaver have a positive net benefit to the environment and are an important part of the natural ecology. Beaver dams create ponds, which improve water quality by promoting the settlement of fine sediments. The ponds also provide important salmon habitat for spawning and over-wintering juveniles, as well as wetlands for waterfowl. The dams trap organics and spawned-out salmon carcasses that enrich the food web.

Timber harvesting is generally limited to trees four to 12 inches in diameter (at stump level), but occasionally beaver damage results in undesirable aesthetic conditions or even flooding.

Controlling beaver activity is generally not desirable. However, where activity is probable along stream corridors, it is important to protect desirable and important trees by constructing and regularly adjusting tree cages or using other alternate deterrents before damage occurs (ADF&G, 2000).



Beaver have a positive net benefit to the environment. Their activity improves water quality for salmon and other wildlife.

Insect Pests

Pest populations and relative forest injury fluctuate over time and season and are affected by multiple factors including weather, climate, hosts, and predators. The health of the forest is generally another factor governing a pest's potential to cause significant damage. Trees that are under physiological stress are more susceptible to injury and mortality. Like insect populations,

forest stress is often affected by multiple factors, including flood, drought, fire, wind and snow damage, weather, climate, pollution, timber harvesting, and previous defoliation.

Each year, the USDA Forest Service's Department of Agriculture State, and Private Forestry, Forest Health Protection (FHP) program and the Alaska Department of Natural Resources Division of Forestry's Forest Health Protection Program (AKDOF) coordinate a statewide effort to detect pest activity and other threats in Alaska's forests. Their efforts result in an annual report entitled *Forest Health Conditions in Alaska*, which details current health issues and pest activity, provides follow-up on previously reported issues, and highlights other related activities and research. Much of the following information is based on the 2009 report (USDA 2009).

Bark Beetles

Spruce Beetle (*Dendroctonus rufipennis*)

The spruce beetle is the most significant mortality agent of white and Lutz spruce in South-central Alaska. This pest has been active in and around Anchorage since 1970. Current activity includes significant blocks in the Cook Inlet basin. Excessive breeding material (i.e., dead and dying spruce) and continued favorable weather support the continued success of this pest population (USDA, 2009). More than 3% of Anchorage's forests are composed of white spruce.

Target species:

- White spruce (*Picea glauca*)
- Lutz spruce (*Picea x lutzii*) (Sitka/white hybrid)

Contributing factors:

- Slash/windthrow
- Dead/dying spruce
- Climate change

Northern Spruce Engraver Beetle (*Ips perturbatus*)

Of historically greater significance in interior regions, the northern spruce engraver beetle generally attacks trees previously stressed by drought, flooding, mechanical damage, soil compaction, fire, windthrow, and other factors. However, in higher populations, the beetle will readily attack healthy trees. Populations can increase rapidly as a result of poor slash management on construction and timber harvesting projects, including fuel woodcutting. Beetles mature in the slash, drop to the ground, where they over-winter, and emerge the following spring to attack nearby host trees. With favorable climate and excessive slash (and windthrow), this pest has the potential to cause forest mortality over an extensive area (USDA, 2009). More than 7% of Anchorage's forests are composed of white spruce and black spruce forests.

Target species:

- White spruce (*Picea glauca*)
- Black spruce (*Picea mariana*)
- Lutz spruce (*Picea x lutzii*)

Contributing factors:

- Increased fuel-wood harvesting by a greater number of people
- Transportation of infested fuel wood to previously un-infested areas

- Poor slash management
- Windthrow
- Dead/dying spruce
- Climate change



A recent windthrow infested with attacking spruce beetles.

Defoliators

Sawflies and Alder Defoliation

Three species of sawflies are responsible for severe alder defoliation in Alaska: woolly alder sawfly (*E. ovata*), striped alder sawfly (*H. crocea*), and European green alder sawfly (*M. pulveratum*). These defoliators, termed “skeletonizers,” consume all leaf tissues except the veins, leaving the plant “thin-looking, brown, and easily detectable from the air.” Overlapping ranges and differences in peak feeding periods lead to severe defoliation of riparian alders, especially thin-leaf alder (*Alnus incana*, subspecies *tenuifolia*) beginning late June and extending through August. The long-term effects of repeated, severe defoliation are unknown at this time (USDA, 2009). More than 8% of Anchorage's forests are composed of alder species.

Target:

- Alder species (*Alnus* spp.)

Contributing factors:

- Introduced invasive species

The woolly alder sawfly and the green alder sawfly are two of seven species known to have been introduced into Alaska (USDA, 2009) (Table 14).

Table 14. Invasive sawfly species that have been introduced into Alaska (USDA, 2009)

Sawflies That have Been Introduced Into Alaska (USDA)		
Sawfly Species	Host	Distribution
<i>Eriocampa ovata</i>	<i>Alnus tenuifolia</i>	South-central, Southeast
<i>Monsoma pulveratum</i>	<i>Alnus tenuifolia</i>	South-central, Interior
<i>Profenusa thomsoni</i>	<i>Betula</i> spp.	South-central, Interior
<i>Fenusa pumila</i>	<i>Betula</i> spp.	South-central, Interior
<i>Fenusa dohmii</i>	<i>Alnus</i> spp.	Interior
<i>Pristiphora erichsonii</i>	<i>Larix laricina</i> , <i>L. siberica</i>	South-central, Interior
<i>Heterarthrus nemoratus</i>	<i>Betula</i> spp., <i>Alnus</i> spp., <i>Populus</i> spp.	South-central

Yellow-Headed Spruce Sawfly (*Pikonema alaskensis*)

The yellow-headed spruce sawfly is a native pest, responsible for the defoliation of both white spruce (*P. glauca*) and Colorado spruce (*P. pungens*) in the landscape, causing the removal and replacement of many large, expensive trees. This pest has moved beyond stressed landscape plants and has begun to attack open grown spruce trees (USDA, 2009). More than 9% of Anchorage's forests are composed of spruce species, including white spruce, black spruce, and Sitka spruce.

Target species:

- Spruce (*Picea* spp.)

Birch Leaf Miners (*Profenusa thomsoni*, *Fenusa pumila*, and *Heterarthrus nemoratus*)

Birch leaf mining injury has been primarily attributed to three species of sawflies, including the amber-marked birch leaf miner (*P. thomsoni*), the late birch leaf edge miner (*H. nemoratus*) and the birch leaf miner (*F. pumila*). Monitoring in the Anchorage Bowl for the amber-marked birch leaf minor began in 2006. Populations and infestations appear to rise and fall on an annual basis (USDA, 2009). More than 8% of Anchorage's forests are composed of birch species.

Target species:

- Birch (*Betula* spp.)

Invasive Insects – A Threat to All Alaska Forests

The USDA Forest Service has identified invasive plant and animal species as a threat to all Alaska forestlands. Exotic pests and pathogens can be introduced through nursery stock, shipping containers, wood packing materials, lumber, pallets, firewood, and other similar avenues. As a primary transportation hub for transpolar air traffic and commercial goods entering Alaska, the threat of exotic pest introduction into Anchorage is high. Home to Ted Stevens Anchorage International Airport; two small plane airports (Lake Hood and Merrill Field) providing access to bush/rural Alaska for private and charter planes for remote cabin sites, hunting, and fishing; and a major railroad terminal, the Port of Anchorage (Alaska's largest seaport) handles 90% of consumer goods in Alaska (city-data.com). Most consumer goods that enter or leave Alaska pass through Anchorage. In addition, Alaska has the highest per capita

personal pilot licenses, adding to the number of people flying to remote areas and further increasing chances for the introduction of invasives into pristine wilderness. Birch leaf miner has made an appearance in Soldotna on the Kenai Peninsula and is believed to have hitchhiked on vehicles from Anchorage. It was first found in the Fred Meyer parking lot, a popular stop for fishermen and for many cars, trucks, and RVs traveling further down the peninsula.

A pest introduced into Anchorage not only threatens local forestlands, but could also quickly spread to other more remote areas of the state, including high value wildlands, refuges, and parks. Exotic and invasive species like gypsy moth (*Lymantria dispar*) pose an especially high level of threat to Alaska's pristine ecosystems. As evidenced in other parts of the country, the introduction of exotic species like Asian Longhorned beetle (ALB, *Anoplophora glabripennis*) and emerald ash borer (EAB, *Agrilus planipennis*) can be devastating and costly.

Early Detection Rapid Response Monitoring

Non-native bark and ambrosia beetles, defoliators, and woodborers are a serious threat to our nation's forests (Table 15). Case histories of exotic insects, including ALB and EAB, have demonstrated the importance of early detection to effective quarantine and control efforts. Since 2008, the Division of Agriculture has placed monitoring traps for EAB. The risk of exotic woodborers is considered low and trap results so far have been negative (USDA, 2009). There is some concern that vehicles traveling into Alaska have the potential to introduce EAB and other exotic woodborers by transporting firewood into the state, especially in recreational vehicles. Although ash trees (*Fraxinus* spp.) are not native in Alaska, a number have been introduced into the landscape and are performing well. As a major transportation hub, Anchorage is a primary location for locating the funnel traps.



***Early Detection Rapid Response
Insect Funnel Trap***

Table 15. Non-Native Insects Considered as Potential Targets for EDRR (USDA, 2009)

EDRR Target Pests	Species	Approximate Native Distribution
Golden haired bark beetle	<i>Hylurgops palliates</i>	Europe and N. Asia
Mediterranean pine engraver beetle	<i>Orthotomicus erosus</i>	Asia, Mediterranean
Six-spined engraver beetle	<i>Ips sexdentatus</i>	Across Europe
European spruce beetle	<i>Ips typographus</i>	Central Europe
Lesser pine shoot beetle	<i>Tomicus minor</i>	Europe
Common pine shoot beetle	<i>Tomicus piniperda</i>	Europe
European hardwood ambrosia beetle	<i>Trypodendron domesticum</i>	China
Camphor shot borer	<i>Xylosandrus nutilatus</i>	Asia
Sirex woodwasp	<i>Sirex noctilio</i>	Europe, Asia, N. Africa
Asian longhorned borer	<i>Anoplophora glabripennis</i>	China
Brown spruce longhorned borer	<i>Tetropium fuscum</i>	Europe and Russia
Pine-tree lappet	<i>Dendrolimus pini</i>	Europe

Firewood

The importation of firewood into Alaska poses a threat to forest health because of its potential to harbor many harmful pests. The accidental introduction of pests and disease in firewood and other wood-based products, such as shipping crates, pallets, and wood packing materials has been a factor of pest and disease introduction and distribution in other areas of the country. Pests, including gypsy moth, oak wilt, and EAB, often remain undetected as they hitchhike on firewood into previously uninfected, healthy locations. This threat is so severe that APHIS issued a federal order in October 2008 requiring that all shipments of hardwood species firewood entering the US from Canada be subjected to heat treatment (USDA, 2009). The annual influx of tourists during the summer months increases the risk of unintentional pest introduction. Public education can play a critical role in reducing this risk, as well as providing an opportunity to educate the public about pests of interest.

Disease

Alder Decline

Alder species (*Alnus* spp.) are currently experiencing decline on a nearly statewide level. The organism or group of organisms responsible has yet to be definitively identified. Along with sawfly, alder canker (*Valsa melanodiscus*) may be playing a role. Lab inoculations have proven that the canker fungus is pathogenic on thin-leaf alder (*Alnus incana ssp tenuifolia*). Other canker species may be playing a role as well, but their pathogenicity has not yet been established (USDA, 2009). In addition, root disease pathogens in the genus *Phytophthora* seem to be contributing to the decline as well. With considerable funding and attention being given to the issue, there will likely be more definitive information available in the future (USDA, 2009).

Invasive Plants

Invasive plants are species with the ability to thrive outside of their natural environment. Invasives often compete aggressively for available resources such as water, nutrients, and

sunlight. Highly aggressive species can be a real threat to native forests, outcompeting native species for space and available resources and disrupting the natural ecosystem. Invasive plants are often introduced by unwitting gardeners as ornamentals or arrive as hitchhikers in potting media. Once introduced, they can quickly be spread by birds and other wildlife, wind, and water. A recent study by Jeffery Conn (Conn, et al., 2008) collected and/or germinated a total of 51 non-native weeds in nurseries and container media. Ten of those weed species are listed as highly to moderately invasive in Alaska. One, Canada thistle, is a prohibited species by Alaska statute.

Consumer education and public outreach are critical for reducing the incidence of introduced exotic and invasive plant species. Enlisting the cooperation of retail and wholesale outlets to recognize invasive species, develop and practice good weed management policies, and use sterile soil media, can greatly minimize the opportunities for introduction into landscapes and natural forests.

Mayday Tree/European Bird Cherry (Prunus padus)

While there are numerous invasive weed species in Anchorage, there is currently only one that threatens tree canopy composition in natural forests. *Prunus padus* (Mayday Tree/European bird cherry), commonly cultivated as an ornamental, has spread into native forest stands. The mayday tree has earned an invasiveness rating of 74 on a scale of 100 on the Alaska Exotic Plants Information Clearinghouse (AKEPIC). The species exhibits a dense, shrubby growth up to 30 feet that reduces light, nutrient availability, and soil moisture for other species. Stands of mayday are outcompeting and eliminating native willow in riparian forests.



Mayday trees form a dense barrier behind this row of newly planted park trees.

Climate Change

Globally, temperatures have increased an average of 1.36° F over the last century. However, global climate change effects are amplified at higher latitudes. According to the Alaska Climate Research Center, from 1949 to 2009, the average annual temperature in Anchorage has increased by 3° F and seasonal change has been more pronounced, with an increase in average winter temperature of 5.8° F. Climate effects such as coastal erosion, increased storm effects, permafrost melt, and sea ice retreat are forcing the relocation of some rural Alaskan communities. In September 2007, the Alaska Climate Change Sub-Cabinet Committee was formed to serve in an advisory capacity to the Office of the Governor on climate change strategy. Along with melting glaciers, rising sea levels, and increased storm activity, the committee reports that Alaska can expect an increased frequency and intensity of spruce bark beetle activity and forest fires (Alaska.gov). A recent study of white spruce seems to support that prediction, demonstrating that, while the growing season may be longer, temperature-induced drought conditions have stressed white spruce populations, resulting in a decrease in annual growth (Barber et al., 2000). The 2009 forest health report (USDA, 2009) recounts additional research indicating that white spruce in Alaska's boreal forests have experienced a significant decrease in growth over recent years, seemingly attributable to climatic warming trends (Chapin et al., 2006).

Because trees are long-lived, climatic shifts including above-normal temperatures and below-normal precipitation have a greater impact and long-term effects on forest health. Stress and decreased growth response predispose forests to attack from spruce beetle as well as other pest and disease causing organisms, inhibiting immune and attack response and amplifying injury and mortality rates. The consequences of forest stress can be expected to continue to manifest over the foreseeable future. If current climate trends persist, beetle infestations and defoliating pests may become more common and wildfires may increase in both incidence and intensity. The consequences of these effects may influence significant changes in the current ecosystem structure.

Unregulated Use and Improper Maintenance

An ever-expanding population leads to increased use and impact on Anchorage's forests as well as an increased threat of litter and wildfires. Hikers, backpackers, cyclists, and other users increase traffic on existing trails and often create new trails, impacting plants and wildlife, and contributing to erosion and habitat destruction. In 2008, Chugach State Park began revising its Master Plan in response to an increase in users. Revisions to the plan, originally adopted in 1980, will address increased use, access issues, and resource protection resulting from the rapid growth in Anchorage (Chugach State Park).

In addition to recreational users, Anchorage has experienced an increase in homeless camps. Municipal officials estimate that there are approximately 3,000 individuals, including 100 violent offenders, occupying unsanctioned, transitory camps within Anchorage forests. These communities damage water quality and habitat and threaten forests and urban areas with litter, human waste, and an increased risk of wildfire.

Another issue related to greater use is the increase of unregulated harvesting of forest products. Some residents, especially those on the wildland urban interface (WUI), harvest fuel wood from nearby public lands. Birch bark harvesting, which is done for both native cultural uses and by hobbyists, is also a threat to forest trees. Although experienced and skilled harvesters may be

able to remove bark without harming the tree, inexperienced harvesters often girdle the stem, leading to decreased vigor and tree mortality. In addition to fuel and birch bark, users often harvest mushrooms and berries, which, in extreme cases, could impact the availability and sustainability of wildlife food sources. Public education and outreach can help ensure that forest areas are protected from harmful practices and overharvest.

With more than 700 miles of trails throughout the Municipality, there are a wide variety of users, some with specific expectations and needs. While many trails are unmaintained wilderness trails, more than 200 miles are maintained to some degree. While the municipality does address hazards such as trees that fall or are in danger of falling on trails, maintenance, including thinning, pruning, and crown raising, is most often performed by clubs and user groups, including volunteers from the Anchorage Park Foundation, TREErific Anchorage, and the Nordic Skiing Association of Anchorage, among others. With so many trails to manage, volunteers are vital to maintaining both the access and safety of trail users. Most trail maintenance activities are unregulated and occasionally unsanctioned, which can sometimes lead to overzealous or improper practices that harm trees. Training and certification of volunteers who perform tree maintenance would increase the likelihood that organizational goals and policies would be adhered to, provide greater protection for individual trees, promote forest health, and reduce risk exposure.

Threats to Public Safety

Wildfire

The greatest threat to public safety related to forestland in Anchorage is that of wildfire, especially in locations where homes abut natural forests, including Eagle River Valley and the eastern bowl on the Chugach State Park boundary. As a wildland interface community, Anchorage Fire Department works with neighborhoods and community councils to develop specific community wildfire protection plans and action strategies to help residents prepare for wildland fire. Creating and maintaining a defensible space around homes and structures can greatly reduce the risk of property loss and increase personal safety in the event of a wildfire.

Hazard Trees

Urban and forest trees can become hazardous due to declining health or poor structure, as well as from damage caused by poor maintenance practices, lack of maintenance, and weather. Hazardous trees are rated based on the size of the tree part likely to fail, the probability of failure in the near future, and the presence of a target (people or property). While most forestland trees pose little threat due to the lack of any target, trees along trails and roadways may pose unacceptable hazards to people and/or property. Regular inspection, identification, and mitigation of hazardous trees are important components of forestland management. Adopting policies that ensure that trees along trails are pruned correctly and roots are not damaged can significantly reduce structural issues related to poor maintenance.

Crime

While not a direct threat to the forestland, criminals may use forests to camouflage illegal activities or to lie in wait for an unsuspecting victim. An increased incidence of homeless camps on Anchorage forestlands has led to an increased risk of crimes against persons as well as vandalism to facilities and forest resources. These communities threaten forests and urban areas

with litter, human waste, crime, and an increased risk of wildfire. Maintaining visibility clearance within trail corridors and patrolling problem areas can increase safety for recreational users. Enforcing the prohibition against camping in unauthorized locations and removal of unregulated homeless camps may reduce the risk of crimes against persons and property, as well as damage to natural resources.

Wildlife

The proximity of wildlife, especially bear, moose, and wolves, to urban areas does pose some risk to residents, visitors, and pets. These animals can be dangerously aggressive under certain conditions. Increased human populations and development have significantly reduced wildlife habitat and open space and placed considerable environmental pressure on these populations. Maintaining significant forest stands and contiguous wildlife and riparian corridors provides these populations with the space and habitat critical to their continued positive coexistence with human populations in the wildland urban interface. Public outreach, education, and signage in high-use locations where contact with these animals is most likely can provide residents and visitors with the information they need to stay safe and/or avoid contact. In addition, reducing attractants, such as garbage, helps these species remain reliant on a wild diet and reduces their attraction to humans and population centers.

Beaver damage to trees near trails and structures may create hazards for persons and property. Regular inspection and protection, or removal, of affected trees is necessary.

Current Management of Anchorage Forestlands

Current Management Strategies and Policies

The plans and policies that currently guide the management of Anchorage forestlands include the following:

- Chugach National Forest: *Land and Resources Management Plan*, under jurisdiction of the USDA Forest Service (2000).
- Chugach State Park: *Chugach State Park Management Plan*, under jurisdiction of Alaska Department of Natural Resources (1980).
- Municipality of Anchorage:
 - Responsibility of the Municipal Forester.
 - Forestland management activities are not currently guided by a management plan or specific policies.
 - Activities are reactive in nature and subject to varying availability of funding and other resources.
 - *Anchorage Bowl Park, Natural Resource, and Recreation Facility Plan (2006)*
 - Area-wide Trails Plan (MOA, 1997) provides some direction for clearance/maintenance in trail corridors:
 - Specifies vertical and horizontal clearances for trails and suggests a "10-foot selective thinning zone along all trails, except for trails designated for cross-country skiing, equestrian, dog mushing use, or to interpretive use, and any trails where preservation of existing flora is important."
 - "Selective thinning shall only include limbing of trees to the eight-foot height

and removal of shrubs above three feet if they significantly restrict vision. There shall be no selective thinning within any 25-foot stream protection setback."

- Municipal forestland management, including trail maintenance, does not currently have a dedicated budget funded by MOA.

Current Funding and Volunteer Contributions

The following is a summary of current funding sources that support management of MOA forestlands:

- **\$50,000 (each year 2008-2010) from USDA Forest Service:**
 - Bark beetle suppression; remove/cleanup blowdown and replant white spruce seedlings
 - Supports Youth Employment in Parks
- **Alaska Department of Natural Resources Community Forestry Program**
 - \$112,000 during the period 2008-2010, secured from a competitive federal grant. Funds did not go directly to the Municipality of Anchorage, but funded the Urban Forest Management Plan, inventory software and data collection, staff training, and The Anchorage Forest Assessment and Management Plan.
 - Purchased seedlings for reforestation in parks (\$300-\$500 annually)
 - Funded training for staff (e.g., Society of Municipal Arborist conference sponsorship for municipal arborist)
- **\$150,000 (varies annually) from US Fish and Wildlife and USDA Forest Service**
 - Invasive species management
- **Park and Recreation (varies)**
 - For reactive maintenance (e.g., blowdowns on trails, respond to resident concerns)
- **\$5,000 annually for early detection and rapid response to exotic species from Alaska Division of Forestry and USDA Forest Service Forest Health Protection**
 - Control of weeds and insects
 - Insect traps
- **Firewise**
 - Wildfire mitigation and fuel load reduction
- **Nordic Ski Association of Anchorage**
 - Trail maintenance
 - Purchase and assist in planting seedlings
- **Anchorage Park Foundation (Clean n' Green) (anchorageparkfoundation.org)**
 - Acquires community challenge grants (50/50 match) for community projects (up to \$40K/project); not all projects are specific to Anchorage forestlands.
- **Trail Watch**
 - Pruning, thinning, and raising tree crowns in trail corridors
- **Anchorage TREErific**

- Assist with reforestation, tree stewardship, educational programs, tree walks, and landscape awards.
- **Society of American Foresters**
 - Annual seedling sale provides a source of native seedlings and raises funds for University of Alaska Fairbanks (UAF) forestry program scholarships

Conclusion

Anchorage forestlands are critical to the quality of life of residents, visitors, and wildlife and the conservation of these forests is important to maintaining the character and identity of this unique community. While forestlands provide obvious amenities to both animals and humans, they also provide substantial quantifiable environment benefits to the community. Based on the two case studies evaluated in the forestland assessment (Chapter 3), an acre of paper birch/deciduous forest has a replacement value of approximately \$637,362 and is annually providing an estimated \$3,673 in environmental benefits, including:

- Protecting surface water quality through the interception of 304,779 gallons of stormwater valued at \$3,292 (the estimated cost of treating or mitigating the effects of stormwater pollutants and sediments);
- Protecting and improving air quality by absorbing and filtering 63 pounds of air pollutants (net value \$88.93); and
- Sequestering 21 tons of CO₂ (\$292).

One acre of mixed conifer/deciduous forest has a replacement value of \$684,385 and is annually providing an estimated \$6,314 in environment benefits, including:

- Protecting surface water quality by intercepting 544,561 gallons of stormwater valued at \$5,882;
- Protecting air quality by absorbing and filtering 78 pounds of air pollutants (net value - \$31.94 due to BVOC emissions); and
- Sequestering 32.6 tons of CO₂ (\$465).

Twenty-five percent of Anchorage's forestlands are composed of deciduous forests, including paper birch. Seventeen percent are mixed conifer/deciduous forests. While it may not be possible to directly extrapolate the benefits illustrated by these case studies over the entire forest, it's obvious that Anchorage forestlands are providing substantial health and environmental benefits.

Residents and visitors who responded to the stakeholder survey overwhelmingly valued the benefits forests provide to water and air quality along with those to wildlife habitat, recreation, and aesthetics. They viewed management of forests and parks as comparable to other public assets and services including public safety, schools, health and social services, and roadways. The respondents had the greatest concern for development as a threat to Anchorage forestlands, followed by removal for other uses, and lack of funds to manage. Perhaps most importantly, respondents expressed a willingness to explore (and even suggest) options for generating funds to support forest conservation and management.

While the assessment concluded that the overall average tree canopy cover within municipal boundaries is 59%, much of this canopy (75%) is in parks, greenbelts, and open space, including state and national forestlands. Nearly half the population in Alaska lives in Anchorage; a reflection of the overall attractiveness of the community, supported by the presence of an

international airport, an abundance of urban amenities, and proximity to Alaskan wilderness and unlimited opportunities for world-class recreation.

The population of Anchorage has increased 234% since Alaska became a state in 1959 and is expected to increase another 32% by 2020. Unfortunately, all of this activity and associated development have taken a toll on the forestland resource. While it's easy to believe that this resource is unlimited and self-sustaining, the truth is that these lands face multiple threats, including wildfire, invasive and exotic insect and plant species, climate change, bark beetles, and an increase in unregulated use. However, the greatest threat to the continued health and sustainability of Anchorage's public forest resource is development. Based on surrounding forestlands, the Anchorage bowl has lost nearly one-half of its original forests. Today, the bowl has an average tree canopy cover of only 35%. That's already below the 40% recommended by American Forests.

While continued growth and development is vital to the social and economic well-being and sustainability of the community, the conservation of significant forestlands is equally vital to the continued livability and attractiveness of the community. Significant and high-value forestlands, which tend to have mature, healthy tree populations and/or are contributing to contiguous forests or wildland corridors, provide the greatest environmental benefits. Without proper consideration, forest canopy and significant forests will continue to diminish until the loss of ecosystem benefits begins to take a toll on the health and vitality of the community.

While the overall average canopy cover is estimated to be 59%, approximately 45% of that is a mix of low shrubs, scrub, and sparse vegetation comprised primarily of willow and alder species. While this type of cover is beneficial for wildlife browsing and habitat, the environmental benefits are less than that produced from larger species forests (e.g., deciduous, conifer, and mixed). In addition, because the imagery used in this assessment was recorded a minimum of three years ago, several large parcels of forestland have already been cleared; a loss not reflected in this analysis. Moreover, considering that forestland on private parcels and military reserves is not subject to municipal standards and that even forests in parks are not immune from removal and development, the time has come to recognize that Anchorage's forestlands are not an infinite resource. Given how much canopy has already been lost, it's not hard to imagine the future of Anchorage if appropriate policies that protect public forests are not soon adopted.

Smart growth requires consideration of natural resources. The preservation and protection of significant forests is vital to the realization of many of the environmental and sustainability goals established by the *Anchorage 2020* comprehensive plan. A forestland management plan provides a framework for the goals and objectives that will ensure that appropriate measures are adopted and that future planning and development includes consideration for this priceless public resource. An effective plan will aim to conserve the overall level of tree canopy and associated benefits while supporting growth and development and respecting the rights of property owners to make decisions about their land. The plan should explore creative opportunities to collaborate, share resources, and to secure sustainable funding to support both conservation and management of public forestlands. Finally, the plan must provide long-term guidance for forest management and the shared vision necessary to ensure that Anchorage's forestlands always remain a distinct and valuable resource.

Chapter 3: Forest Benefits – Two Case Studies

To illustrate the quantity and value of benefits derived from Anchorage forestlands, trees were inventoried at two sample sites, one on the Campbell Creek Greenbelt and the other at Russian Jack Springs Park. Each of these sample sites represents a different forest type typical of Anchorage forestlands. The complete inventory from both sample sites was used in conjunction with i-Tree *Streets*, a STRATUM Analysis Tool (*Streets* v 3.0.13; i-Tree v 3.0.16), to develop a resource analysis of the overall structure and condition at the site. The results quantify the value and environmental benefits of two representative samples of Anchorage forestland including:

- A description of the current structure of each sample plot including species composition, relative age distribution, overall condition, and replacement value.
- Quantified value of the environmental benefits provided by each forest type, including benefits to air quality, water quality, and the reduction of atmospheric carbon (CO₂).

Streets calculates environmental benefits based on species and tree size as well as climate zone data from key tree species. This analysis used default benefit values for the North Climate Zone. *Streets* calculates replacement value based on the cost approach (CTLA, 1992) and assumes the value of a tree is equal to the cost of replacing the tree in its current state. This value is not relative to the timber value of the forestland, and instead is a consideration of the flow of environmental benefits that are a reflection of species and tree size. A more detailed discussion of the methods used in this analysis can be found in Appendix A.

Campbell Creek

The Campbell Creek Greenbelt study plot is located on the south side of Campbell Creek Trail, approximately 200 feet northeast of the tunnel where the trail intersects with Arctic Boulevard. It can be accessed from either the Arctic Boulevard pedestrian path or the Taku Lake parking lot, which is approximately one-half mile northeast of the plot (upper right corner of the picture) (Figure 30).

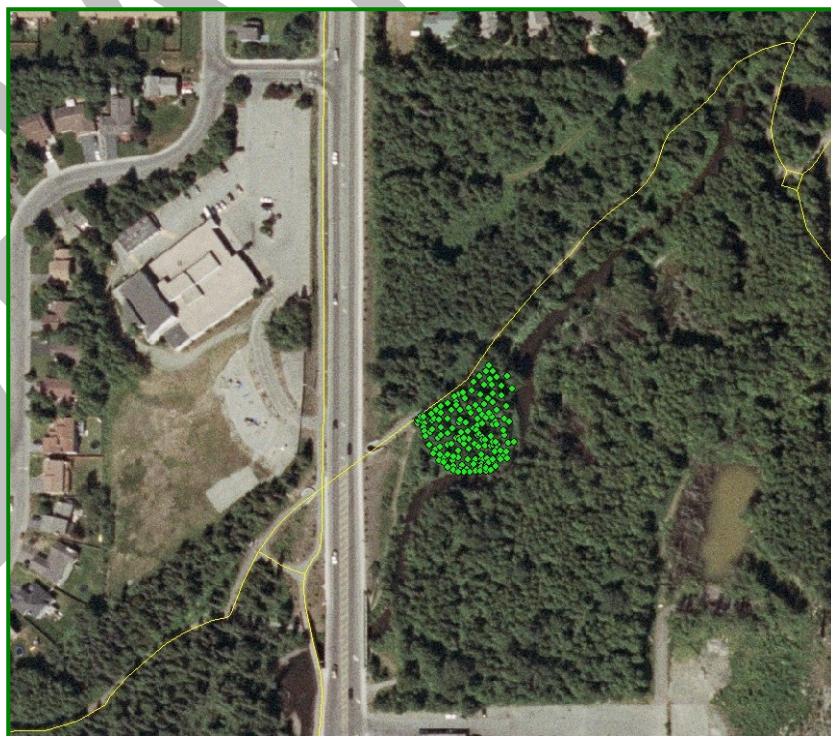


Figure 30. Location of Campbell Creek Greenbelt sample inventory plot site (north is top of photo).

All trees were collected within the 0.5-acre plot boundary of the Campbell Creek Greenbelt sample site. This site is most typical of a closed paper birch forest (Vierack, et al., 1992).

Russian Jack Springs Park

The Russian Jack Springs Park sample plot is located in the park on the trail system, which runs adjacent to the golf course. Parking is available at the Lidia Selkregg Chalet at the end of Lidia Selkregg Lane off Debarr Road. Access to the plot is via the trail heading south, approximately 900 feet from the Chalet (Figure 31). All trees were collected within the 0.2-acre plot boundary of the Russian Jack Springs sample site. This site is representative of a mixed forest (Vierack, et al., 1992).

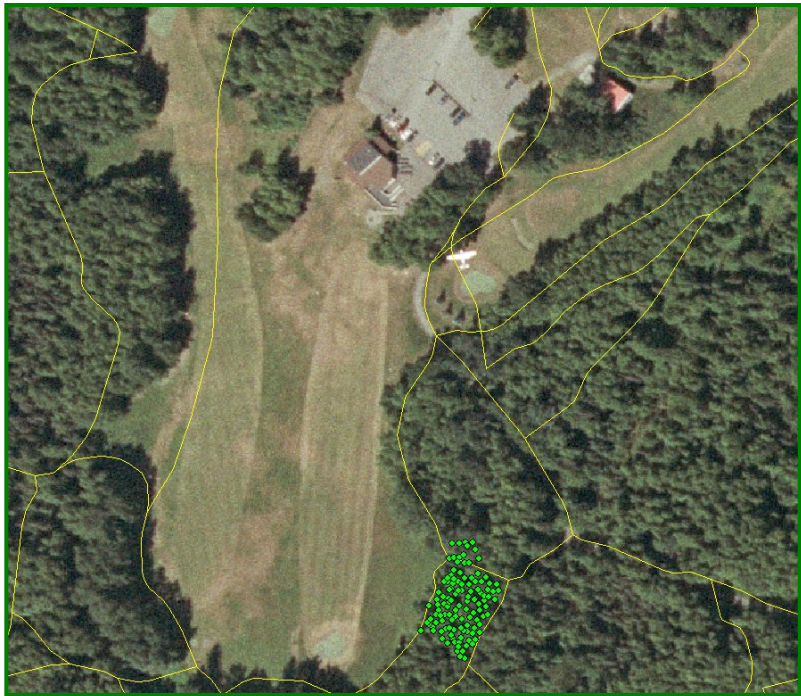


Figure 31. Location of the Russian Jack Springs sample inventory plot site (north is top of photo)

Summary of Forest Structure

Campbell Creek

The Campbell Creek sample includes 159 unmaintained trees in a natural forest setting, most representative of a closed paper birch forest (Viereck, et al., 1992). Analysis of forest structure is the first step towards understanding the benefits provided by these trees. Upon analysis of species composition, age distribution, condition, and replacement value, DRG estimates that the following information characterizes this forestland sample:

- Six distinct tree species were identified in the inventory. The population consists of paper birch (*Betula papyrifera*, 53%), European bird cherry (*Prunus padus*, 15%), alder (*Alnus* spp., 11%), white spruce (*Picea glauca*, 11%), willow species (*Salix* spp., 9%) and black cottonwood (*Populus trichocarpa*, 1%).
- The age structure of this site is established but not overmature, with 36% of trees measuring a DBH (diameter at breast height, measured at 4'6" above the ground) of 6 inches or less, 61% measuring between 7 and 24 inches DBH, and 3% measuring greater than 24 inches DBH.
- The population is determined to be in very good condition overall, with 90% of trees rated in good or better than good condition.

Replacement cost of one acre of Anchorage's paper birch forest with trees of similar size, species, and condition is estimated to be approximately \$637,362 per acre.

- The 0.5-acre site at Campbell Creek has sequestered 143 tons of carbon (CO₂), valued at approximately \$2,140. This is equal to 286 tons (\$4,280) per acre of similar forest type.
- Replacement of all 159 trees in the Campbell Creek sample with trees of similar size, species, and condition would cost \$318,681. This is equal to \$637,362 per acre of similar forest type.

Russian Jack Springs Park

The Russian Jack Springs Park sample includes 118 unmaintained trees in a natural forest setting, most representative of a closed mixed forest (Vierack, et al., 1992). An analysis of forest structure is the first step towards understanding the benefits provided by these trees. Upon analysis of species composition, age distribution, condition, and replacement value, DRG estimates that the following information characterizes this forestland sample:

- Six distinct tree species were identified in the inventory. The population consists of white spruce (*Picea glauca*, 49%), paper birch (*Betula papyrifera*, 33%), black spruce (*Picea mariana*, 7%), black cottonwood (*Populus trichocarpa*, 7%), alder species (*Alnus* spp., 2%), and willow species (*Salix* spp., 2%).
- The age structure of this site illustrates a relatively young but established population, with 44% of trees measuring 6 inches or less DBH, 55% measuring between 7 and 24 inches DBH, and 0.9% measuring greater than 24 inches DBH.
- The population is determined to be in overall fair condition with 59% of trees rated fair and 24% rated good or better.
- The 0.2-acre site at Russian Jack Springs Park has sequestered 69 tons of carbon (CO₂), valued at approximately \$1,041. This is equal to 347 tons (\$5,204) per acre of similar forest type.
- Replacement of all 118 trees in the Russian Jack Springs Park sample with trees of similar size, species, and condition would cost \$136,877. This is equal to \$684,385 per acre of similar forest type.

Replacement cost of one acre of Anchorage's mixed forest with trees of similar size, species, and condition is estimated to be approximately \$684,877 per acre.

Summary of Forest Benefits

Campbell Creek

Annually, the forestland trees at the half-acre Campbell Creek inventory site provide cumulative benefits to the community at an average value of \$11.55 per tree, for a value of \$1,837 per year (\$3,673 per acre of similar forest type). This sample of paper birch forest is providing the following substantial annual benefits:

- The 0.5-acre of paper birch forest at Campbell Creek currently sequesters 9.7 tons of atmospheric CO₂ per year, valued at \$146 (\$0.92 per tree), for a total of 19.4 tons of CO₂ per acre (\$292) annually for similar forest type.

- Net air quality improvements provided by the half-acre of paper birch forest at Campbell Creek through the removal of air pollutants are valued at \$44.46 (\$0.28 per tree), for a total of \$88.92 per acre annually for similar forest type.
- The 0.5-acre of paper birch forest at Campbell Creek intercepts an estimated 152,390 gallons of stormwater annually valued at \$1,646 (\$10.35 per tree), for a total of 304,780 gallons (\$3,292) per acre annually for similar forest type.

Annual benefits from one acre of Anchorage's paper birch forest similar in condition and composition to the Campbell Creek sample are estimated to be \$3,673 per acre.

Russian Jack Springs Park

Annually, the forestland trees at the 0.2-acre Russian Jack Springs Park inventory site provide cumulative benefits to the community at an average value of \$10.70 per tree, for a value of \$1,263 per year (\$6,314 per acre of similar forest type). This sample of a mixed forest is providing the following substantial annual benefits:

- The 0.2-acre of mixed forest at Russian Jack Springs Park currently sequesters 6.2 tons of atmospheric CO₂ per year, valued at \$93 (\$0.79 per tree), for a total of 31 tons of CO₂ per acre (\$465) annually for similar forest type.
- As a result of high BVOC emissions from white spruce (*Picea glauca*), the mixed forest sample inventory collected at Russian Jack Springs Park is presenting a slight net negative impact on air quality by producing a net gain of 0.4 pounds of BVOC emissions and a net loss in benefits of -\$6.39 overall. This equates to approximately two pounds (2 lb.) emitted BVOC (-\$31.94) annually per acre of similar forest type. Considering the total value of environmental benefits provided by one acre of similar forest type (\$6,314) this loss is negligible.
- The 0.2-acre mixed forest at Russian Jack Springs Park intercepts an estimated 105,912 gallons of stormwater annually valued at \$1,176 (\$9.97 per tree), for a total of 544,561 gallons (\$5,882) per acre annually for similar forest type.

Annual benefits from one acre of Anchorage's mixed forest similar in condition and composition to the Russian Jack Springs Park sample are estimated to be \$6,314 per acre.



The sample inventory site collected at Campbell Creek is an example of a closed paper birch forest characterized by a dominant overstory of paper birch and a minimum 60% tree canopy cover.

Forest Structure

Campbell Creek – Population Composition

A total of 159 trees were collected at Campbell Creek including 85 paper birch (*Betula papyrifera*), 23 European bird cherry (*Prunus padus*), 18 alder (*Alnus* spp.), 17 white spruce (*Picea glauca*), 15 willow species (*Salix* spp.) and 1 black cottonwood (*Populus trichocarpa*) (Figure 32) (Table 16). With the exception of European bird cherry, an exotic, invasive species comprising 15% of the overall population, the Campbell Creek sample plot is most typical of a closed paper birch forest (Vierack, et al., 1992) of moderate age. Paper birch dominates the overstory and the overall canopy cover is greater than 60%. White spruce is present (11%) but not abundant in the population and the overall population is nearly 90% deciduous (hardwood) species.

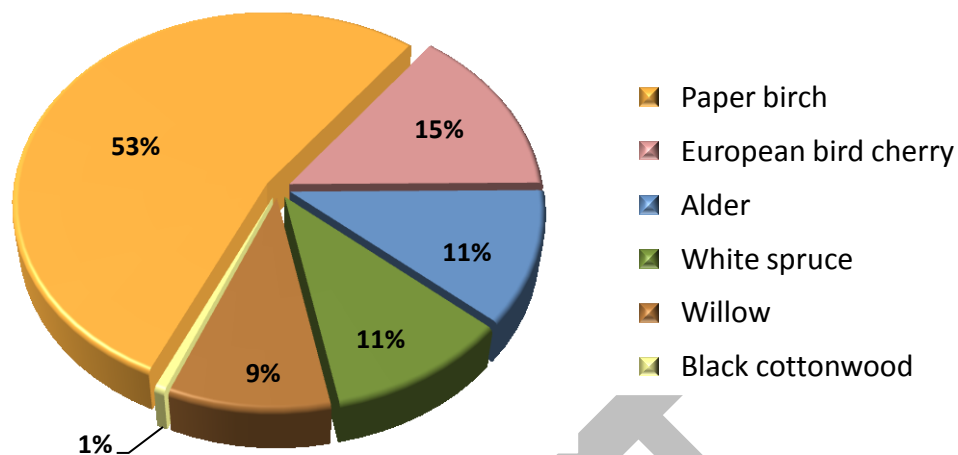


Figure 32. Population composition of Campbell Creek sample inventory.

Russian Jack Springs Park – Population Composition

A total of 118 trees were collected at Russian Jack Springs, including 58 white spruce (*Picea glauca*), 39 paper birch (*Betula papyrifera*), 8 black spruce (*Picea mariana*), 8 black cottonwood (*Populus trichocarpa*), 3 alder species (*Alnus* spp.), and 2 willow species (*Salix* spp.) (Figure 33) (Table 17). The Russian Jack Springs Park sample plot is most typical of a closed mixed forest (Vierack, et al., 1992) of moderate age. While spruce make up 56% of the overall population, neither broadleaf or conifer dominates the tree layer. Overall canopy cover is greater than 60%.

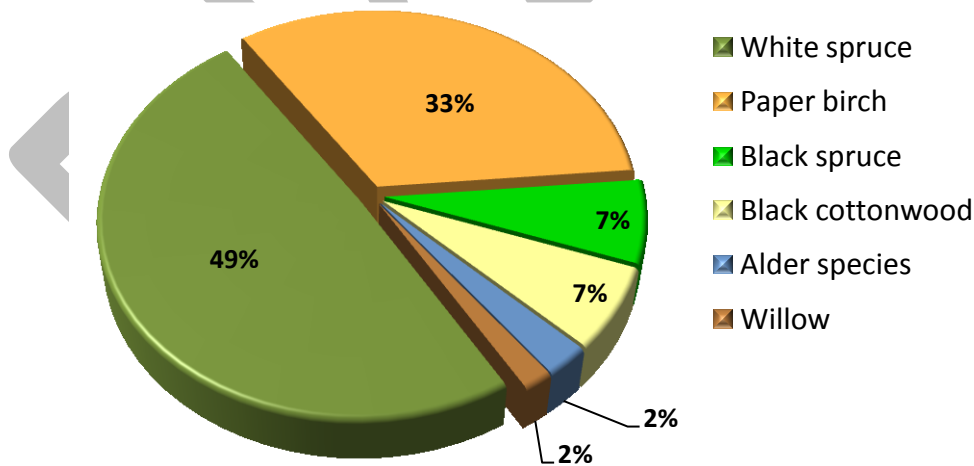


Figure 33. Population composition of Russian Jack Springs Park sample inventory

Table 16. Total Population of Campbell Creek Sample Site (0.5 acres)

Species	DBH Class (in)								Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	
Broadleaf Deciduous Large (BDL)									
Paper birch	7	16	40	15	3	3	0	1	85
Willow	1	0	12	1	0	1	0	0	15
Black cottonwood	0	0	0	1	0	0	0	0	1
BDL Total	8	16	52	17	3	4	0	1	101
Broadleaf Deciduous Medium (BDM)									
Alder species	0	9	5	3	1	0	0	0	18
BDM Total	0	9	5	3	1	0	0	0	18
Broadleaf Deciduous Small (BDS)									
European bird cherry	12	5	6	0	0	0	0	0	23
BDS Total	12	5	6	0	0	0	0	0	23
Conifer Evergreen Large (CEL)									
White spruce	4	3	3	7	0	0	0	0	17
CEL Total	4	3	3	7	0	0	0	0	17
Sample Total	24	33	66	27	4	4	0	1	159

Table 17. Total Population of Russian Jack Springs Park Sample Site (0.2 acres)

Species	DBH Class (in)						Total
	0-3	3-6	6-12	12-18	18-24	24-30	
Broadleaf Deciduous Large (BDL)							
Paper birch	0	10	19	10	0	0	39
Black cottonwood	2	0	1	1	4	0	8
Willow	0	2	0	0	0	0	2
BDL Total	2	12	20	11	4	0	49
Broadleaf Deciduous Medium (BDM)							
Alder species	1	0	1	0	0	1	3
BDM Total	1	0	1	0	0	1	3
Conifer Evergreen Large (CEL)							
White spruce	9	20	28	1	0	0	58
Black spruce	0	8	0	0	0	0	8
CEL Total	9	28	28	1	0	0	66
Sample Total	12	40	49	12	4	1	118

Campbell Creek – Condition

Seventy-six percent (76%) of the trees inventoried at the Campbell Creek sample site were in very good condition, followed by 14% in good condition, 6% in fair condition, 2% in poor condition, and 2% dead or dying (Figure 34).

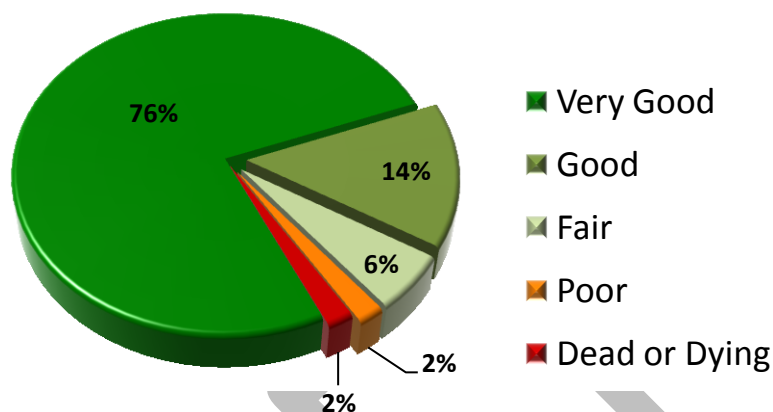


Figure 34. Overall condition of trees in Campbell Creek sample inventory

Russian Jack Springs Park – Condition

Fifty-nine percent (59%) of the trees inventoried at the Russian Jack Springs Park sample site were in fair condition, followed by 21% in good condition, 3% very good condition, 3% in poor condition, and 14% dead or dying (Figure 35). Black spruce (*Picea mariana*) is performing poorly at this site in comparison to other species, with 75% of the species determined to be dead or dying. White spruce (*Picea glauca*) also seem to be struggling at this location (14% dead or dying), possibly attributable to site disturbance or changes in weather.

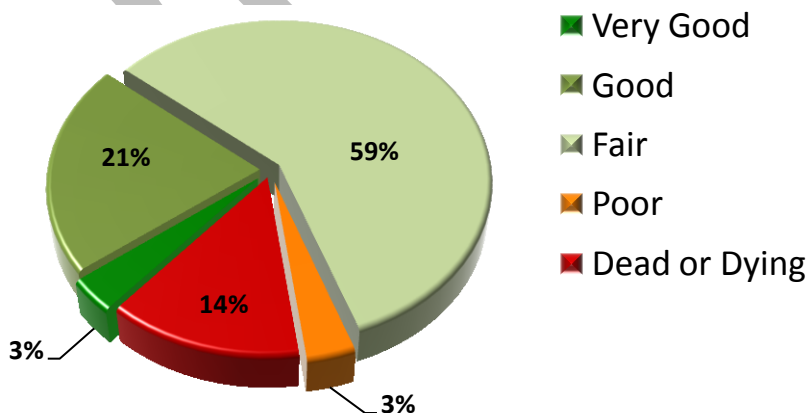


Figure 35. Overall condition of trees in Russian Jack Springs Park sample inventory

Campbell Creek – Relative Age and Level of Succession

The relative age analysis of the Campbell Creek sample inventory reveals an established but not overmature forest. Thirty-six percent (36%) of the overall population consists of young trees with a DBH of 6 inches or less, 61% are established (7 to 24" DBH), and 3% are maturing or mature trees with a DBH greater than 24 inches (Figure 36).

European bird cherry (*Prunus padus*), an exotic, invasive species, is showing the greatest regeneration with 52% of the species population having a DBH less than 3 inches. White spruce (*Picea glauca*, 24% < 3" DBH), paper birch (*Betula papyrifera*, 8% < 3" DBH), and willow (*Salix* spp., 7% < 3" DBH) are also regenerating.

Neither alder (*Alnus* spp.) nor black cottonwood (*Populus trichocarpa*) shows evidence of recent regeneration at the inventory sample site.

A closed paper birch forest, such as this sample from Campbell Creek is characterized by a dominant overstory of paper birch with a minimum of 60% tree canopy cover. Leaf fall is generally heavy and birch regeneration may be limited to stem and suckers sprouting from the base of old trees. White and black spruce may be present but not in abundance. A paper birch forest such as this is generally the result of fire or other disturbance, and will eventually progress to an open or closed spruce forest after passing through various successional blends of spruce and birch (Vioreck, et al., 1992).

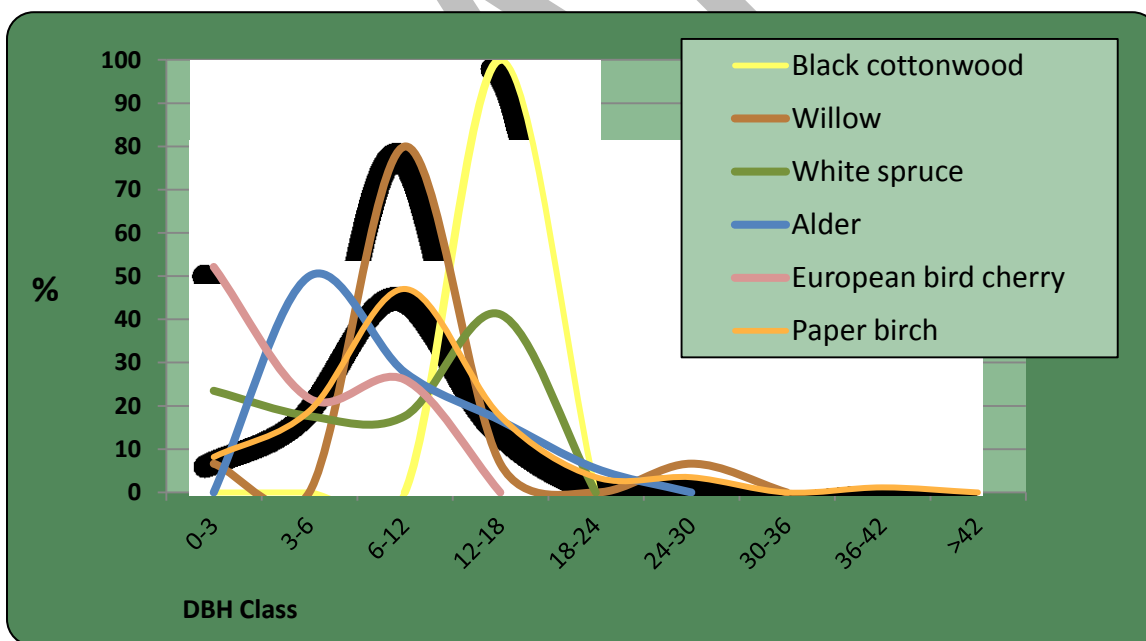


Figure 36. Relative age distribution of tree species in Campbell Creek sample inventory

Russian Jack Springs Park – Relative Age and Level of Succession

The age structure of the Russian Jack Springs Park sample inventory illustrates a relatively young but established population with 44% of trees measuring 6 inches or less DBH, 55% measuring between 7 and 24 inches DBH, and 0.9% measuring greater than 24 inches DBH (Figure 37).

Alder species (*Alnus* spp.) is showing the greatest regeneration with 33% of the species population having a DBH less than 3 inches. Black cottonwood (*Populus trichocarpa*, 25% < 3" DBH), white spruce (*Picea glauca*, 16% < 3" DBH), and black spruce (*Picea mariana*, 2% < 3" DBH) are also regenerating.

Neither paper birch (*Betula papyrifera*) nor willow (*Salix* spp.) shows evidence of recent regeneration at the inventory sample site.

In a closed mixed forest such as this sample inventory from Russian Jack Springs Park, neither conifers nor hardwoods have clear dominance in the population and the tree canopy cover is at least 60%. White spruce-birch forests tend to occur in well-drained and moderately well drained soils free of permafrost on slopes and flood plains. Spruce-birch forests generally develop from pure or nearly pure birch stands where, over time, the slower growing spruce become dominant as the relatively short-lived birch begin to senesce and die. These forests will eventually develop into stands of pure spruce, which may open up if spruce regeneration is not sufficient to retain a closed overstory (Viereck, et al., 1992).

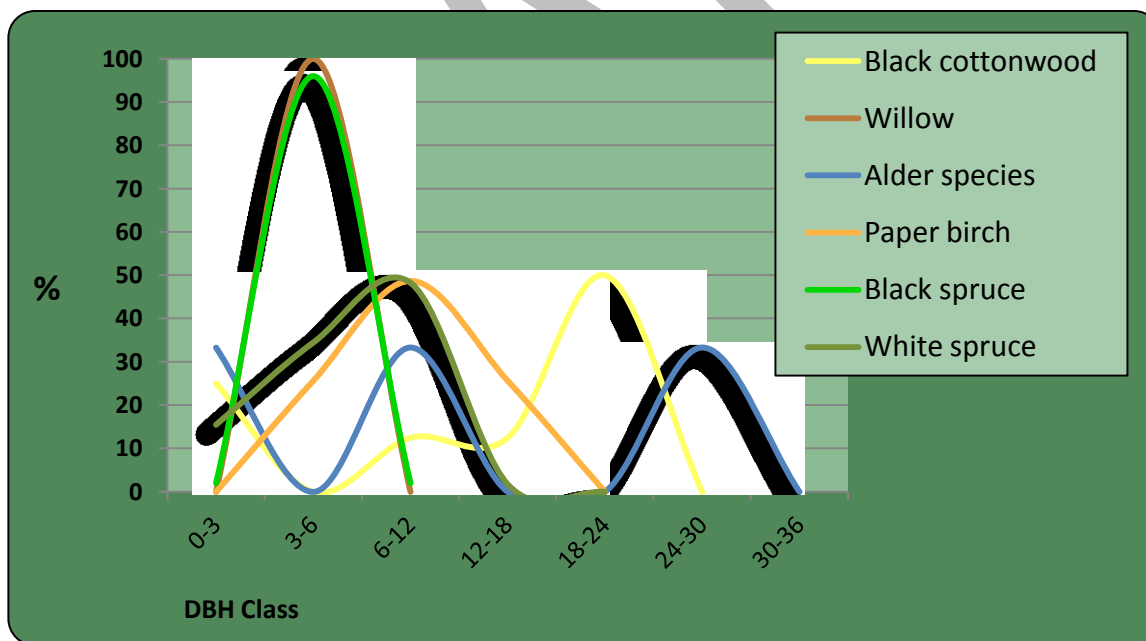


Figure 37. Relative age distribution of tree species in Russian Jack Springs Park sample inventory

Campbell Creek – Replacement Value

Replacement value accounts for the historical investment in trees over their lifetime and is a way of describing the value of a tree population (and/or average value per tree) at a given time. Replacement value is a reflection of current population numbers, size, placement/location, and condition. There are several methods available for obtaining a fair and reasonable perception of a tree's value (CTLA, 1992; Watson, 2002). The cost approach used in i-Tree *Streets* analysis assumes the value of a tree is equal to the cost of replacing the tree in its current state (Cullen, 2002).

The current value of the sample inventory collected at Campbell Creek is \$318,681 (Table 18). As a relatively young population, this stand has the potential to appreciate in value as the trees mature over time.

To replace one acre of paper birch forest with trees of similar size, species, and condition to those collected in this sample inventory would cost \$637,362.

Table 18. Replacement value of the sample inventory collected at Campbell Creek (0.5 acres)

Species	Total
Paper birch	208,658
European bird cherry	18,253
Alder species	37,581
White spruce	32,227
Willow	19,132
Black cottonwood	2,829
Sample total	\$318,681

Russian Jack Springs Park – Replacement Value

The sample inventory collected at Russian Jack Springs Park has a current value of \$136,877 (Table 19) and the potential to appreciate in value over time as the tree population matures.

To replace one acre of mixed forest with trees of similar size, species, and condition to those collected in this sample inventory would cost \$684,385.

The black spruce population at this sample location have a low replacement value because 75% are dead or dying. This indicates the species is unsuitable to this site, possibly due to an environmental change or other disturbance that occurred since these trees sprouted. Alternately, it's possible the population sprouted during a particularly wet period when conditions were more favorable for black spruce.

Table 19. Replacement value of the Russian Jack Springs Park sample inventory (0.2 acres)

Species	Total
White spruce	42,148
Paper birch	61,151
Black spruce	775
Black cottonwood	25,201
Alder species	6,986
Willow	616
Sample total	\$136,877



In a closed mixed forest, such as this site where a sample inventory was collected at Russian Jack Springs Park, neither conifers nor hardwoods have clear dominance in the population, and the tree canopy cover is at least 60%.

Forest Benefits

Water Quality Preservation through Decreased Stormwater Runoff

Rainfall interception by trees and forests can greatly reduce the amount of stormwater that flows into collection systems and ultimately reaches critical waterways where salmon spawn and other sea and aquatic life depend on clean, pollution-free water. Trees and forests intercept rainfall in their canopy, which act as mini-reservoirs, reducing, slowing, and controlling runoff at the source. Tree canopy lessens the impact of raindrops on bare soils. Root growth and decomposition increase the holding capacity of soil and the rate of infiltration by rainfall and

snowmelt, promoting the recharge of ground water. These processes greatly reduce the flow and volume of runoff, avoiding erosion and preventing sediments from entering streams, lakes, and inlets. *Streets* calculates stormwater benefits relative to canopy size, a value based on species and tree size.

Campbell Creek – Stormwater Benefits

Trees in the Campbell Creek sample inventory intercept 152,390 gallons of stormwater annually, for an average of 958 gallons per tree and a value of \$1,646 (Table 20). **Assuming similar type and structure, one acre of paper birch forest can intercept 304,779 gallons (\$3,292) annually.** Black cottonwood (*Populus trichocarpa*) intercepts the greatest amount of rainfall at 1,792 gallons (\$19.36) per tree annually, followed by white spruce (*Picea glauca*) at 1,559 gallons (\$16.83) per tree, and paper birch (*Betula papyrifera*) at 1,074 gallons (\$11.60) per tree. European bird cherry (*Prunus padus*) an exotic, invasive species, has the lowest stormwater benefits at 94 gallons (\$1.01) per tree annually.

Table 20. Stormwater Benefits from the Campbell Creek Sample Inventory (0.5 acres)

Species	Total Rainfall Interception (Gal)	Total \$ Value	% of Population	% of Total \$	Avg. \$/tree
Paper birch	91,268.65	985.77	53.46	59.89	11.60
European bird cherry	2,154.25	23.27	14.47	1.41	1.01
Alder species	14,590.76	157.59	11.32	9.57	8.76
White spruce	26,495.12	286.17	10.69	17.39	16.83
Willow	16,088.40	173.77	9.43	10.56	11.58
Black cottonwood	1,792.42	19.36	0.63	1.18	19.36
Sample total	152,389.60	\$1,645.92	100%	100%	\$10.35

Russian Jack Springs Park – Stormwater Benefits

The mixed forest inventory sample collected at Russian Jack Springs Park intercepts 108,912 gallons annually (923 gallons/tree) valued at \$1,176 (Table 21). **That's equivalent to 544,561 gallons (\$5,882) per acre of mixed forest of similar structure.** Black cottonwood intercepts the greatest amount of rainfall at 1,681 gallons (\$18.16) per tree, followed by alder species (*Alnus* spp.) at 1,415 gallons (\$15.28) per tree, and paper birch at 968 gallons (\$10.46) per tree. Willow (*Salix* spp.) has the lowest stormwater benefits at 288 gallons (\$3.11) per tree annually.

Table 21. Stormwater benefits from the Russian Jack Springs Park sample inventory (0.2 acres)

Species	Total Rainfall Interception (Gal)	Total \$ Value	% of Population	% of Total \$	Avg. \$/tree
White spruce	49,606.37	535.79	49.15	45.55	9.24
Paper birch	37,768.84	407.93	33.05	34.68	10.46
Black spruce	3,264.73	35.26	6.78	3.00	4.41
Black cottonwood	13,451.27	145.28	6.78	12.35	18.16
Alder species	4,245.46	45.85	2.54	3.90	15.28
Willow	575.54	6.22	1.69	0.53	3.11
Sample total	108,912.21	\$1,176.33	100%	100%	\$9.97

Air Quality Preservation and Improvement

Anchorage's trees and forests protect and improve air quality in the community in four fundamental ways:

- Absorb gaseous pollutants such as ozone (O₃) and nitrogen dioxide (NO₂) through leaf surfaces;
- Intercept particulate matter (PM₁₀), such as dust, ash, dirt, pollen, and smoke;
- Increase oxygen levels through photosynthesis; and
- Lower air temperatures and reduce O₃ levels on long summer days through shade and transpiration.

However, it's important to recognize that while trees do a great deal to absorb air pollutants (especially ozone and particulate matter), they also negatively contribute to air pollution. Trees emit various biogenic volatile organic compounds (BVOCs), such as isoprenes and monoterpenes, which can also contribute to ozone formation. While the negative effects of BVOC emissions are generally outweighed by the positive air quality contribution of trees, BVOC emissions are accounted for by *Streets* in the net air quality benefit. The value of air quality benefits is quantified based on the cost of treating the same amount of pollutants through other means (e.g., air filter).

Campbell Creek – Air Quality Benefits

Each year, more than 31 pounds of NO₂, PM₁₀, SO₂, and O₃ are intercepted or absorbed by the sample inventory collected at Campbell Creek, for a value of \$71.23 (Table 22). Paper birch (*Betula papyrifera*) contributes the greatest overall benefits (\$50.27) due to their prevalence in the population. Black cottonwood (*Populus trichocarpa*) is the greatest per tree contributor (\$1.11) to annual air quality improvement.

Approximately ten pounds of BVOCs, which negatively affect air quality, are emitted annually from this population, offsetting the total air quality benefit by -\$26.77. White spruce (*Picea glauca*) is the heaviest per tree emitters of BVOCs (0.5 lbs).

Net air pollutants removed and released by the Campbell Creek sample inventory are valued at \$44.46 annually, or \$88.92 per acre of similar paper birch forest.

Russian Jack Springs Park – Air Quality Benefits

The sample inventory at Russian Jack Springs Park intercepts or absorbs 16 pounds of NO₂, PM₁₀, SO₂, and O₃ annually for a value of \$35.19 (Table 23). Paper birch contributes the greatest overall benefits (\$14.54) and black cottonwood is the greatest per tree contributor (\$1.52) to annual air quality improvement.

Approximately 16 pounds of BVOCs are emitted annually from this population, offsetting the total air quality benefit by -\$41.58. White spruce (*Picea glauca*) is the heaviest per tree emitter of BVOCs (0.6 lbs).

As a result of the high BVOC emission of white spruce, this population is presenting a slight net negative impact on air quality, producing 0.4 pounds of emitted BVOC (-\$6.39). **This equates to approximately two pounds emitted BVOC (-\$31.94) annually per acre of similar forest type.** Considering the total value of environmental benefits provided by one acre of similar forest type (\$6,314) this loss is negligible.

Table 22. Air quality benefits from Campbell Creek sample inventory (0.5 acres)

Species	Deposition O ₃ (lb)	Deposition NO ₂ (lb)	Deposition PM ₁₀ (lb)	Deposition SO ₂ (lb)	Total Deposition (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total \$ Value	% of Total Tree Numbers	Avg. \$/tree
Paper birch	13.63	3.37	3.62	1.46	50.27	0.00	0.00	22.07	50.27	53.46	0.59
European bird cherry	0.67	0.17	0.21	0.08	2.52	- 0.01	- 0.03	1.12	2.49	14.47	0.11
Alder species	1.38	0.34	0.40	0.15	5.12	- 1.85	- 4.84	0.43	0.28	11.32	0.02
White spruce	1.29	0.32	0.37	0.16	4.80	- 8.39	- 21.90	- 6.25	- 17.10	10.69	- 1.01
Willow	2.01	0.50	0.54	0.21	7.41	0.00	0.00	3.26	7.41	9.43	0.49
Black cottonwood	0.30	0.07	0.08	0.03	1.11	0.00	0.00	0.49	1.11	0.63	1.11
Sample Total	19.28	4.77	5.22	2.10	\$71.23	- 10.26	-\$26.77	21.12	\$44.46	100%	\$0.28

Table 23. Air quality benefits from Russian Jack Springs Park sample inventory (0.2 acres)

Species	Deposition O ₃ (lb)	Deposition NO ₂ (lb)	Deposition PM ₁₀ (lb)	Deposition SO ₂ (lb)	Total Deposition (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total \$ Value	% of Total Tree Numbers	Avg. \$/tree
White spruce	1.23	0.31	0.40	0.15	4.60	- 14.43	- 37.67	- 12.35	- 33.08	49.15	-0.57
Paper birch	3.93	0.97	1.12	0.42	14.54	0.00	0.00	6.44	14.54	33.05	0.85
Black spruce	0.02	0.00	0.01	0.00	0.07	- 0.92	- 2.40	- 0.88	- 2.33	6.78	-0.29
Black cottonwood	3.31	0.82	0.84	0.36	12.19	0.00	0.00	5.32	12.19	6.78	1.52
Alder species	1.03	0.25	0.27	0.12	3.79	- 0.58	- 1.51	1.08	2.27	2.54	0.76
Willow	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	1.69	0.00
Sample total	9.52	2.35	2.63	1.04	\$35.19	- 15.93	-\$41.58	- 0.38	-\$6.39	100%	\$0.49

Atmospheric Carbon Dioxide Reduction

Anchorage's trees and forests are providing a significant reduction in atmospheric carbon dioxide (CO₂) for a positive environmental and financial benefit to the community. Trees reduce CO₂ through growth and sequestration of carbon as woody and foliar biomass. When a tree dies however, most of the CO₂ that accumulated as woody biomass is released back into the atmosphere during decomposition, except in cases where the wood is recycled. i-Tree *Streets* considers the release of CO₂ in decomposition when calculating the CO₂ reduction benefits of trees. The value of these benefits is quantified based on the cost of treating the same amount of CO₂ through other means.

Campbell Creek – CO₂ Benefits

To date, the trees in the Campbell Creek sample inventory have sequestered 143 tons of CO₂ valued at \$2,140 (Table 24). Annually, this tree stand reduces (sequesters) 10.4 tons of CO₂, valued at \$156.41, into woody and foliar biomass. Accounting for estimated CO₂ emissions from tree decomposition (0.7 tons), this population provides an annual net reduction in atmospheric CO₂ of 9.7 tons, valued at \$146.12, an average of \$0.92 per tree (Table 24). **This equates to 19.4 tons (\$292.24) annually per acre of similar paper birch forest.**

Black cottonwood (*Populus trichocarpa*) provides the highest per tree CO₂ benefits of \$2.01, followed by willow (*Salix* spp.) at \$1.15 per tree, and paper birch (*Betula papyrifera*) at \$1.10 per tree. European bird cherry (*Prunus padus*) provides the least amount of annual CO₂ benefits at \$0.30 per tree.

Russian Jack Springs Park – CO₂ Benefits

The trees in the Russian Jack Springs Park sample inventory have sequestered 69 tons of CO₂ to date, valued at \$1,041 (Table 25). Annually, these trees reduce 6.5 tons of CO₂, valued at \$97.93, into woody and foliar biomass. Accounting for estimated CO₂ emissions from tree decomposition (0.3 tons) this population provides an annual net reduction in atmospheric CO₂ of 6.2 tons, valued at \$92.93, an average of \$0.79 per tree (Table 25). **This equates to 31 tons (\$464.64) annually per acre of similar mixed forest.**

Black cottonwood provides the highest per tree CO₂ benefits of \$1.81, followed by paper birch at \$1.09 per tree, and alder (*Alnus* spp.) at \$0.95 per tree. Black spruce, which is performing poorly at this site (75% dead or dying), is providing the least amount of annual CO₂ benefits at \$0.35 per tree. It's important to note that faster-growing broadleaf trees often provide the greatest annual CO₂ benefits while slower-growing and typically longer-lived conifers often have higher cumulative benefits.

Table 24. CO2 benefits from Campbell Creek sample inventory (0.5 acres)

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release(lb)	Decomposition Release (\$)	Net Total (lb)	Total (\$)	% of Total Tree Numbers	% of Total \$	Avg. \$/tree
Paper birch	13,434.41	100.76	- 951.78	- 7.14	12,482.63	93.62	53.46	64.07	1.10
European bird cherry	959.76	7.20	- 32.53	- 0.24	927.22	6.95	14.47	4.76	0.30
Alder species	2,142.54	16.07	- 126.18	- 0.95	2,016.37	15.12	11.32	10.35	0.84
White spruce	1,580.50	11.85	- 91.13	- 0.68	1,489.37	11.17	10.69	7.65	0.66
Willow	2,452.41	18.39	- 153.08	- 1.15	2,299.33	17.25	9.43	11.80	1.15
Black cottonwood	285.50	2.14	- 17.62	- 0.13	267.88	2.01	0.63	1.38	2.01
Sample total	20,855.12	\$156.41	- 1,372.33	-\$10.29	19,482.80	\$146.12	100%	100%	\$0.92

Table 25. CO2 benefits from Russian Jack Springs Park sample inventory (0.2 acres)

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release(lb)	Decomposition Release (\$)	Net Total (lb)	Total (\$)	% of Total Tree Numbers	% of Total \$	Avg. \$/tree
White spruce	4,068.29	30.51	- 121.20	- 0.91	3,947.10	29.60	49.15	31.86	0.51
Paper birch	5,933.41	44.50	- 279.50	- 2.10	5,653.91	42.40	33.05	45.63	1.09
Black spruce	382.80	2.87	- 5.41	- 0.04	377.39	2.83	6.78	3.05	0.35
Black cottonwood	2,117.82	15.88	- 185.29	- 1.39	1,932.53	14.49	6.78	15.60	1.81
Alder species	455.33	3.41	- 74.04	- 0.56	381.29	2.86	2.54	3.08	0.95
Willow	99.96	0.75	- 1.78	- 0.01	98.18	0.74	1.69	0.79	0.37
Sample total	13,057.61	\$97.93	- 667.22	-\$5.00	12,390.40	\$92.93	100%	100%	\$0.79

Total Environmental Benefits

Campbell Creek – Total Benefits

The Campbell Creek sample inventory of 0.5 acres of closed paper birch forest yields an estimated total annual environmental benefit worth \$1,837, including the interception of 152,390 gallons of stormwater (\$1,646), absorption or capture of 31 pounds of air pollutants (net value \$44.46), and the sequestration of 10.4 tons of CO₂ (net value \$146.12) (Table 26). To replace these trees with an equal number of trees of similar species, size, and condition would cost \$318,681.

Table 26. Total annual environmental benefits from the Campbell Creek sample inventory (0.5 acres).

Species	Stormwater Benefit (\$)	Air Quality Benefit (\$)	CO ₂ Benefit (\$)	% of Total Population	Total Annual Benefits
Paper birch	985.77	50.27	93.62	53.46	1,129.66
European bird cherry	23.27	2.49	6.95	14.47	32.71
Alder species	157.59	0.28	15.12	11.32	172.99
White spruce	286.17	- 17.10	11.17	10.69	280.24
Willow	173.77	7.41	17.25	9.43	198.42
Black cottonwood	19.36	1.11	2.01	0.63	22.48
Sample total	\$1,645.92	44.46	\$146.12	100%	\$1,836.50

Based on this analysis, one acre of paper birch forest of similar health and composition to the Campbell Creek sample inventory is estimated to provide \$3,673 in total annual environmental benefits, including the interception of 304,779 gallons of stormwater (\$3,291.84), absorption or capture of 63 pounds of air pollutants (net value \$88.93), and the sequestration of 20.9 tons of CO₂ (net value \$292.24) (Figure 38). **To replace one acre of paper birch forest similar in size and composition to the Campbell Creek sample inventory would cost \$637,362.**

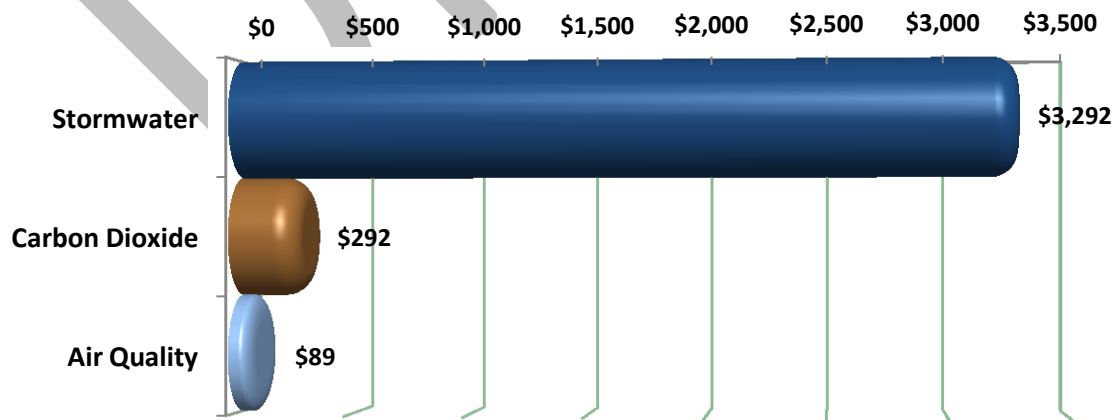


Figure 38. Estimated annual benefits per acre of Anchorage's paper birch forest

Russian Jack Springs Park – Total Benefits

The Russian Jack Springs Park sample inventory of 0.2 acres of closed mixed forest yields an estimated total annual environmental benefit worth \$1,263, including the interception of 108,912 gallons of stormwater (\$1,176), absorption or capture of 16 pounds of air pollutants (net value \$6.39 due to BVOC emissions), and the sequestration of 6.5 tons of CO₂ (net value \$92.93) (Table 27). To replace these trees with an equal number of trees of similar species, size, and condition would cost \$136,877.

Table 27. Total annual environmental benefits from the Russian Jack Springs Park sample inventory (0.2 acres)

Species	Stormwater benefit (\$)	Air Quality Benefit (\$)	CO ₂ Benefit (\$)	% of Total Population	Total Annual Benefits
White spruce	535.79	- 33.08	29.60	49.15	532.32
Paper birch	407.93	14.54	42.40	33.05	464.87
Black spruce	35.26	- 2.33	2.83	6.78	35.77
Black cottonwood	145.28	12.19	14.49	6.78	171.97
Alder species	45.85	2.27	2.86	2.54	50.98
Willow	6.22	0.01	0.74	1.69	6.96
Sample total	\$1,176.33	-\$6.39	\$92.93	100%	\$1,262.87

Based on this analysis, one acre of mixed forest of similar health and composition to the Russian Jack Springs Park sample inventory is estimated to provide \$6,314 in total annual environmental benefits, including the interception of 544,561 gallons of stormwater (\$5,882), absorption or capture of 78 pounds of air pollutants (net value -\$31.94 due to BVOC emissions), and the sequestration of 32.6 tons of CO₂ (net value \$464.64 (Figure 39). **To replace one acre of mixed forest similar in size and composition to the Russian Jack Springs Park sample inventory would cost \$684,385.**

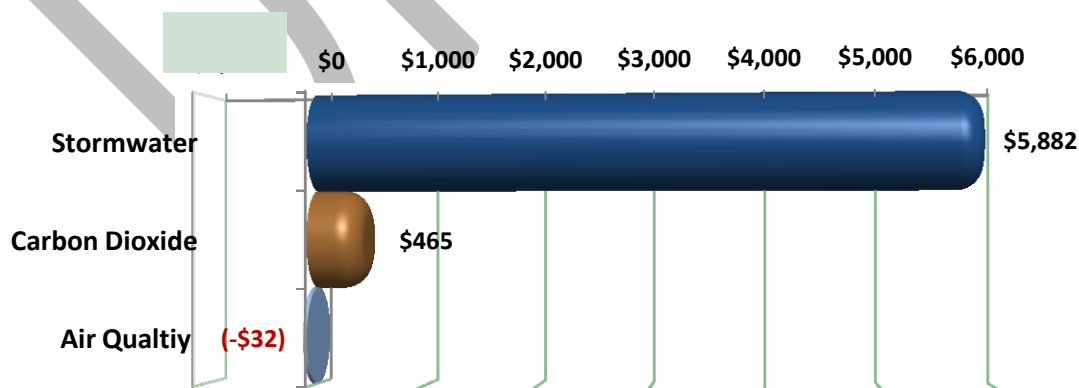


Figure 39. Estimated annual benefits per acre of Anchorage's mixed forest

Chapter 4: Anchorage Forestland Management Plan

Introduction

The purpose of the Anchorage Forestland Management Plan is to provide guidance for forestland management activities with the intent to preserve the condition and health of valuable forestlands and the vital benefits they provide to both humans and wildlife. Conservation and stewardship of Anchorage's forests is critical to the health, safety, and quality of life enjoyed by residents and to the economic development and sustainability of Anchorage communities. These forestlands provide an important link between communities and the Alaska wilderness, supporting a cultural heritage and priceless relationship with nature and wildlife that has defined the character of Anchorage.

Anchorage's forests face many threats to their health and continued sustainability including wildfire, insect and disease pests, climate change, and increased use. Arguably, the greatest threat to Anchorage forestlands is development. Since Alaska became a state in 1959, the Anchorage population has increased by 234% to 277,000 residents (anchorage.net, 2010) and is expected to increase an additional 32% by the year 2010 (ISER). More than half of the original wetlands have been lost and it is estimated that nearly half of the original forest canopy has been lost as well. Today, the average tree canopy cover in the bowl is 34% and nearly one third of that canopy is within parks and greenbelts. To ensure a minimum threshold of green infrastructure (and forest benefits) is maintained as urban areas develop, American Forests recommends a 40% canopy goal.

Continued growth and development are desirable and important to the economic well-being of the community. However, additional development without appropriate considerations for the conservation of Anchorage's valuable natural resources will undoubtedly result in undesirable and costly consequences to both the quality of life and the Anchorage economy. Water quality, in particular, is quickly becoming a very serious issue for many coastal communities. Many cities are now struggling to incorporate trees and natural treatment systems into highly urbanized areas in order to reduce non-point source stormwater pollution runoff and the subsequent devastating effects that runoff has on streams, lakes, and watersheds. The goals and objectives of this plan are intended to support smart growth and continued development, while at the same time conserving and protecting the forestlands, which ensure that Anchorage remains a desirable place to live, conduct business, and enjoy unparalleled scenic beauty and recreational opportunities.

The Forestland Management Plan is specific to public lands within the boundaries of the Municipality of Anchorage and has no authority or jurisdiction over private lands. It is intended to serve as a strategic tool, guiding the course of management activities and preservation of forestlands over the next ten to 15 years. The recommendations are intended to be flexible in response to changing conditions and resource availability and should be periodically evaluated for progress and revised as necessary. They are based on a current assessment of tree canopy cover and threats to forest health (Chapter 2) and forest benefit case studies (Chapter 3). The baseline information determined in the assessment can be used to make further management determinations and site-specific decisions, support the goals and objectives of the plan, and secure the necessary support and funding.

Implementation of these recommendations should begin immediately, but are intended to proceed over time as opportunities, resources, and funding allow.

The overarching intent of the Anchorage Forestland Management Plan is to:

Preserve and enhance Anchorage's natural and developed forests and the benefits they provide that are critical to the quality of life of residents, visitors, and wildlife.

In support of this intention, the plan identifies primary goals and objectives in the following section.

Goals and Objectives

Goals and objectives illustrate the desired path and outcome of the forestland management plan. Goals are broad statements about the desired outcome or change that will occur over time and indicate the long-term success of the plan. Objectives are short-term, precise, measurable steps that support the realization and accomplishment of the stated goal. Objectives provide an additional statement of the ideals expressed by the goal. Goals and objectives are intended to serve as a guide for management activities, which may also include activities of a routine and responsive nature not specifically outlined by the plan. Some objectives support more than one goal and will be indicated for each with a notation of this significance.

For the purpose of this plan:

- **Significant (Landmark) Trees** shall be defined as native species of a mature or semi-mature age in relatively good health with the expectation of survival in the foreseeable future.
- **Significant or High-Value Forest Stands** shall be defined as forest stands encompassing a minimum of 2,000 square feet, and where 25% or more of the tree population is of mature to semi-mature age and in relatively healthy condition with the expectation of survival in the foreseeable future.

Or

May be alternatively defined as a critical component of a contiguous forest and/or wildlife corridor.

Significant trees and forest stands in good condition provide the greatest benefits and highest value of ecosystem services to the community. The determination of significant (landmark) trees and forest stands is at the discretion of the municipal forester or other authority designated by the Municipality of Anchorage.

Policies

With few exceptions, forestland management activities should encourage natural ecological succession and minimal management of trees and forests. Significant and high-value forest stands should be maintained and preserved as wildland areas with minimal recreational amenities (i.e., generally, trails only). Exceptions to these policies include the following:

- Management and reduction of slash and windthrows to control bark beetle and reduce excessive wildfire fuels.

- Maintenance of trail corridors and other recreational-use designated locations, including thinning, crown raising, and structural pruning.
- Control and management of invasive plant species.
- Control and management of insect and other pests deemed a significant threat to Anchorage and/or other Alaskan forestlands.

GOAL: Conserve the current level of overall tree canopy cover at no net loss and maximize the flow of benefits

To preserve and enhance the ecosystem services provided by forestlands, which contribute to the quality of life in Anchorage, including air quality, water quality, socio-economic benefits, tourism, increased property values, and recreational opportunities; and

To preserve ecosystem services, critical corridors, and habitat that support wildlife, including song and migratory bird species, mammals, and anadromous fish and marine mammals; and

To increase canopy in locations with low canopy cover; and

To increase contiguous canopy which provides greater benefits than single trees and smaller, disparate forest stands; and

To monitor and react to threats against Anchorage and/or all Alaskan forestlands, including threats from bark beetles and other insect pests, wildfire, vandalism, climate change, and invasive/ exotic insects and plant species.

Objectives

Fuel-Load Management (Wildfire). Coordinate with fire personnel to identify and reduce/manage excessive fuel loads and develop and maintain firebreaks, hardwood corridors, and defensible space in proximity to residential, high-use recreational facilities, and other high-risk locations. Promote fire and training programs to burn or remove slash piles and reduce fuel loads (and beetle breeding sites).	✓ Critical
Pest Management. Coordinate with USDA Forest Service and Alaska Division of Forestry to monitor pest activity and threats to Anchorage forestlands, and institute responsible and appropriate control measures with consideration to the level of threat, value of forest assets and availability of human and financial resources to address the threat.	✓ Critical
Weed Management. Coordinate with USDA Forest Service and Alaska Division of Forestry to monitor and employ control techniques to manage the spread of invasive plant species (including public outreach and education).	✓ Critical
Bark-Beetle Management. Coordinate with USDA Forest Service and Alaska Division of Forestry to identify and reduce/manage excessive slash and blowdown that support beetle breeding.	✓ Critical
Identify and Map Significant Forests. Identify, prioritize, and map boundaries of significant and high-value forest stands. Explore grants and coordinate with non-profits, volunteers, and/or universities to provide college credits and internships for qualified individuals to determine the location and boundaries of significant forest stands. Initial efforts should focus in areas subject to urban development. Identifying and mapping significant/high-value forest stands and planning ahead for development, and making every possible effort	✓ Important * Supports Additional Goals!

at preservation, can significantly increase opportunities for protection.

Regulate Activities That Threaten Health and Safety of Forestlands. Develop and/or enforce regulations that prohibit activities that threaten the health and safety of public forestlands, including the unregulated harvesting of firewood, seedlings, saplings, conks, and birch bark, as well as camping, campfires, and cooking fires in areas not specifically designated for such activity.

✓ **Important**

Develop Conservation Standards. Develop and implement standards and guidelines for the conservation, protection, and restoration of significant/high-value forest stands.

✓ **Important**

Beaver Damage Management. Protect significant trees in riparian corridors adjacent to recreational use facilities from beaver damage through the construction of wire cages. Note: Monitor and adjust cages as necessary to prevent damage to trunk cambium as tree increases in girth.

✓ **Important**

Moose Damage Management. Protect newly planted and immature trees in restoration/planting areas from moose damage (where necessary) by constructing tree cages that inhibit browsing. Note: Tree protection cages must be monitored for continued effectiveness and removed or modified as tree matures.

✓ **Important**

Identify and Prioritize Areas for Conservation/Reforestation. Identify areas for conservation or restoration of forests. Prioritize conservation/restoration based on high value resources and benefits to humans/wildlife (i.e., where tree canopy can be increased and/or restored to augment tree canopy cover and contiguous forests stands).

✓ **Important**

* **Supports**
Additional Goals!

Focus Reforestation Efforts. Focus reforestation and tree planting activities in locations with low canopy cover and/or that contribute to contiguous forest, watersheds, riparian and wildlife corridors, and areas where wildfire has occurred.

✓ **Important**

Collaborate for Conservation. Collaborate with landowners, non-profits, private companies, and government agencies to acquire and/or conserve lands that support significant forest stands or restoration/reforestation sites with the potential to contribute to contiguous forest stands. (e.g., Alaska Forest Legacy Program, the Great Land Trust, the Conservation Fund, the Nature Conservancy, the Trust for Public Lands).

Where significant/high-value forest stands are identified on private property, explore opportunities and options for land exchange (e.g., HLB, or other), conservation easements, and public/private collaboration methods for forestland protection.

✓ **Important**

* **Supports**
Additional Goals!

* **Requires mapping**
or identification
of Significant
Forest Stands!

Coordinate Conservation with Community Planners. Coordinate with municipal planners and the Heritage Land Bank (HLB) Advisory Commission to conserve (i.e., Park designation - PLI-P) uncommitted public lands held within the HLB inventory where there are existing significant and high-value forestlands and contiguous forest tracts.

✓ **Important**

* **Supports**
Additional Goals!

* **Requires mapping**
or identification
of Significant
Forest Stands!

GOAL: Support smart growth and development while preserving the quality of life in Anchorage

To identify significant forests where preservation is vital to the conservation of forest benefits for ecological, social, or economic systems; and

To improve coordination between municipal, state, and federal agencies, stakeholders, and others who manage or impact trees and forests, ensuring that the consideration of forestlands be incorporated into the decision making process; and

To encourage forestland management participation in planning and development processes (platting, zoning, land-use, etc.), thereby integrating the preservation of significant and high value forest stands into development policies and practices – maximizing the greatest benefits from both.; and

To ensure the preservation of overall forest canopy and significant/high-value forest stands, preserving the unique character of Anchorage, increasing property value, supporting recreation and tourism, thereby encouraging investment and increasing economic income and property tax revenues; and

To maximize the quality of life benefits provided by forestlands to humans and wildlife, including benefits to water quality, air quality, wildlife habitat; and

To conserve wildlife and riparian habitat and protect marine and surface water sources that support the growth and propagation of fish, shellfish, and other aquatic life, and wildlife from unhealthful turbidity and other fine sediments in accordance with Alaska Water Quality Standards (18 ACC 70) (DEC); and

To ensure significant and high-value forestland easements and greenbelt corridors are included within neighborhood developments, thereby providing recreational opportunities and trail access to residents and raising property values.

Objectives

Identify and Map Significant Forests. Identify, prioritize and map boundaries of significant and high-value forest stands. Explore grants and coordinate with non-profits, volunteers, and/or universities to provide college credits and internships for qualified individuals to determine the location and boundaries of significant forest stands. Initial efforts should focus in areas subject to urban development. Identifying and mapping significant/high-value forest stands and planning ahead for development, and making every possible effort at preservation, can significantly increase opportunities for protection

✓ **Critical**

* **Supports Additional Goals!**

Outreach and Education Program. Develop and implement a public outreach/education program to communicate the value of ecosystem benefits provided by Anchorage forestlands and the financial and quality of life consequences if they are lost. It is recommended that this program include at minimum a professional quality handout/pamphlet, a presentation (e.g., PowerPoint), and a public service announcement (PSA) in video format.

The program should focus on the current canopy analysis, the primary threats to Anchorage forestlands (i.e., development/ population expansion, bark beetles), estimations of environmental benefits illustrated in the benefit case studies (with an emphasis on the issues of air quality and surface water quality), and an estimate of how much forestland (tree

✓ **Critical**

* **Supports ALL Goals!**

canopy) has already been lost in the short period of time since Alaska became a state.

Collaborate with non-profits, media groups, government agencies, and others to promote and broadcast PSA's, handouts and educational materials, and presentations to civic and legislative groups.

This program can be used to generate public and legislative support for the protection of Anchorage forestlands and the inclusion of forestland considerations in planning and development processes, as well as funding and support for a comprehensive forest management program and the accomplishment of the other objectives outlined in this plan.

Identify and Prioritize Areas for Conservation/Reforestation. Identify areas for conservation or restoration of forests. Prioritize conservation/restoration based on high value resources and benefits to humans/wildlife (i.e., where tree canopy can be increased and/or restored to augment tree canopy cover and contiguous forests stands).

✓ **Critical**

★ **Supports
Additional Goals!**

Coordinate with Physical Planning Division. Coordinate with MOA Physical Planning Division to ensure consideration of significant/high-value forest stands in planning determinations related to community growth and development, including land use, public and private development reviews, and special projects.

✓ **Important**

★ **Requires mapping
or identification of
Significant Forest
Stands!**

Coordinate Conservation with Community Planners. Coordinate with municipal planners and the Heritage Land Bank (HLB) Advisory Commission to conserve (i.e., Park designation - PLI-P) uncommitted public lands held within the HLB inventory where there are existing significant and high-value forestlands and contiguous forest tracts.

✓ **Important**

★ **Requires mapping
or identification of
Significant Forest
Stands!**

Collaborate for Conservation. Collaborate with landowners, non-profits, private companies, and government agencies to acquire and/or conserve lands that support significant forest stands or restoration/reforestation sites with the potential to contribute to contiguous forest stands. (e.g., Alaska Forest Legacy Program, the Great Land Trust, the Conservation Fund, the Nature Conservancy, the Trust for Public Lands). Where significant/high-value forest stands are identified on private property, explore opportunities and options for land exchange (e.g., HLB, or other), conservation easements, and public/private collaboration methods for forestland protection.

✓ **Important**

★ **Supports
Additional Goals!**
★ **Requires mapping
or identification of
Significant Forest
Stands!**

Recognition of Forestland Management Plan in *Anchorage 2020*. Recognition and adoption by the Anchorage Assembly of the Forestland Management Plan as a component of Anchorage 2020: Anchorage Bowl Comprehensive Plan.

✓ **Important**

Amend Land-Use Regulations and Standards. Amend land use regulations and relevant plans and standards to incorporate standards, policies, and procedures for conservation, protection, restoration, management plans, and standards for significant forest stands.

✓ **Important**

★ **Requires mapping
or identification of
Significant Forest
Stands!**

Revise Land Clearing Permit. Revise Municipality of Anchorage Land Clearing and Grading Permits (MOA Handout AG.09) to require that the identification and mapping of significant trees and forest stands be included as a component of the site plan.

✓ **Important**

★ **Requires mapping
or identification of
Significant Forest
Stands!**

Adoption of Forestland Management Plan as an Element of the Comprehensive Plan. When significant forest stands have been identified and/or mapped, the Anchorage Forestland Management Plan should be adopted as an element in the Comprehensive Plan (21.01.080) (Title 21) in the area of Environmental Quality.

✓ **Important**

★ **Requires mapping
or identification of
Significant Forest
Stands!**

At adoption, amend 21.01.030 PURPOSE OF THIS TITLE (Chapter 21.01; Section 030), by revising purpose "K" which currently states:

K. Encouraging the retention of mature vegetation;

Revised statement (proposed):

K. Encouraging the retention of mature vegetation and significant forest stands, and contiguous forestland corridors, which provide greater ecological, social, and economic benefits than single trees and smaller, disparate forest stands.

Note: Much of Title 21 has only been provisionally adopted by the Assembly but will not take effect until the entire new code is adopted (Title 21, Status of Chapters).

Amend Title 21.07 "Landscape and Design Standards," TABLE 21.07-1: LANDSCAPE UNITS AWARDED: "*Retained Existing Vegetation Mass:*" to encourage and provide greater credit for the preservation of significant natural trees and forest stands in landscape design.

- Current credit award includes the following:

caliper or greater and/or evergreen trees of at least 6 feet in height 15 percent 500+ square feet with a minimum of 5 trees including deciduous trees of 4" caliper or greater and/or evergreen trees of at least 6 feet in height 20 percent 800+ square feet with a minimum of 8 trees including deciduous trees of 4" caliper or greater and/or evergreen trees of at least 6 feet in height 25 percent

- Recommended the addition of credit for a **Significant Stand** as:

2000+ square feet, where 25% or more of the tree population is of mature to semi-mature age, and in relatively healthy condition with the expectation of survival in the foreseeable future

Or

2000+ square feet, defined as a critical component of a contiguous forest and/or wildlife corridor 30 percent

✓ **Important**

★ **Requires mapping or identification of Significant Forest Stands!**

Amend Title 21, 21.05.080 TEMPORARY USES AND STRUCTURES, which currently states:

"This section allows for the establishment of certain temporary uses of limited duration, provided that such uses do not negatively affect adjacent properties or municipal facilities, and provided that such uses are discontinued upon the expiration of a set time period. The construction or alteration of any permanent building or structure is not considered a temporary use."

Revise statement to:

. . . The construction or alteration of any permanent building or structure, or the removal of significant trees or forest stands is not considered a temporary use.

This would limit the land clearing and protect significant forest stands under the conditions for Temporary Use and require compliance with 21.07.080.

✓ **Important**

★ **Requires mapping or identification of Significant Forest Stands!**

Amend Title 21, 21.07.080 LANDSCAPING SCREENING, AND FENCES, C. "Landscape Plan", which currently states:

All landscaping and screening required under this section 21.07.080 shall be reflected on a landscape plan. All development, except for single-family, two-family, three-family, and four-family homes on individual lots, shall have a landscape plan prepared by a licensed landscape architect registered by the state of Alaska or another design professional as allowed by state legislation. The landscape plan shall be reviewed and approved by the decision-making body. A landscape plan may be combined with any land clearing, vegetation protection, erosion control, or snow removal plan required for compliance with other sections of this title. Where a landscape plan is required under this title, the plan shall include the information specified in the Title 21 user's guide.

Amend statement and related standards, guides and policies to include the following language:

Landscape plans which include credit for Landmark (Significant) Trees and Significant Forest Stands must include tree protection provisions in the Development Plan and be approved by the municipal forester. All existing trees and vegetation masses to be retained for landscape units must be identified on the site plan, including provisions for protections, prior to land clearing or grading of site.

✓ **Important**

★ **Requires mapping or identification of Significant Forest Stands!**

GOAL: Preserve recreational opportunities through responsible vegetation management along trails and other high-use areas

To responsibly manage the forestland vegetation that borders Anchorage's more than 700 miles of trails as well as that which borders and exists within high-use recreation areas in Anchorage's approximately 1,131 square miles of parks, greenbelts, and open space lands; and

Recognizing that a primary benefit of Anchorage's forestlands is the unparalleled opportunities presented for recreation on Anchorage's comprehensive trail system, which includes paved trails, un-paved and wilderness trails, and a variety of multi-use trails; and

Recognizing that Anchorage trails provide residents with an important link to wilderness areas, which offer psychological benefits and peaceful, relaxing opportunities to escape from the pressures of work and day-to-day stress.

To promote safe and aesthetically pleasing recreational opportunities for a diverse group of users and activities, including cross-country skiing/skijoring, biking, hiking/walking, running, nature/wildlife viewing, dog mushing, dog walking, equestrian, and snow machining; and

Recognizing that the Anchorage trail system is a vital component of a comprehensive transportation system, linking residents to other areas of the community, including work, shopping, wilderness, social, and cultural attractions; and

Recognizing that a safe and aesthetically pleasing comprehensive trail system is a benefit and attraction that increases the livability and quality of life in Anchorage and encourages economic investment, promotes tourism, and contributes to tax revenue.

Objectives

Develop Tree Care Standards. Develop and implement standards and policies to direct tree care operations in Anchorage's public forestlands, including trail corridors and high-use recreational facilities. Standards should reflect current industry standards, including International Society of Arboriculture Best Management Practices (BMPs), American National Standards *ANSI A300 series* that provide standards for pruning and other tree care operations, and ANSI Z-133, which provides safety standards for all tree care operations.

✓ **Important**
★ **Supports Additional Goals!**

Develop Tree Care Certification Program. Develop and implement a training and certification program for volunteers, stewards, and others who participate in tree care operations on public forestlands. Require that only trained and certified volunteers and contracted personnel may perform specific tree care activities on public forestlands, including but not limited to pruning, thinning, and crown raising. The policy should include language that allows un-trained volunteers to participate in cleanup activities that result from tree care, including the removal of logs, limbs, and downed brush.

✓ **Important**
★ **Supports Additional Goals!**

Tree Hazard Management. Regularly inspect trail corridors to identify hazardous trees. Remove or mitigate hazardous tree situations as soon as reasonably possible. Inspection cycles should be reflective of trail type and level of use.

✓ Important

Tree Management for Trails High-Use Areas. Promote, collaborate, and participate in efforts to maintain forestland vegetation along trails and in high-use recreational locations in a reasonably safe condition. Recognizing that many trails and trail systems within Anchorage forestlands traverse wilderness areas and are intended to retain the character and structure of natural forests, trail maintenance should strive to reasonably maintain the safety of forest vegetation and clearance relative to trail classification and primary use as well as availability of resources and funding. MOA forest maintenance activities should focus primarily on the removal and/or mitigation of hazardous conditions (e.g., hazard trees) and maintaining minimum clearance. Support and collaborate with volunteers, stewards, and user groups (e.g., TREErific Anchorage, Nordic Skiing Association of Anchorage, Alaska Mountain Runners, Adopt-A-Trail, etc.) where possible to maintain forest vegetation.

✓ Important

To promote appropriate vegetation management, tree pruning BMPs, and to reduce risk and liability, the municipal forester, or other authority designated by the MOA should provide direction and leadership to volunteers, user groups, and trail stewardship programs that participate in trail maintenance operations on public forestland.

Bear and Moose Awareness. Coordinate with wildlife and public safety officials to facilitate public outreach and education to users and visitors to encourage awareness of bears, moose, and human criminal elements that may be encountered on forestland trails and other high-use locations. Provide warning signs and emergency contact information at major trailheads and other high-use locations where applicable.

✓ Important

GOAL: Develop a sustainable, cost-efficient forest management program

To generate funding adequate to preserve Anchorage forestlands and the benefits they provide that are critical to the quality of life of residents, visitors, and wildlife; and

Recognizing that though the policy of Anchorage forest management supports minimal management where possible to encourage natural ecological succession and wildland character, the conservation and protection of this vital resource still requires responsible and forward looking stewardship to ensure the resource and benefits are conserved for the future of Anchorage's families and wildlife; and

Recognizing the need to remain pro-active, with the capacity to generate a reasonable response against threats to the health and sustainability of Anchorage's forestland resource as well as threats to all Alaska's forests, including threats of wildfire, exotic weeds, and destructive and/or invasive pests; and

Recognizing that successful forestland management requires a collaboration of many individuals, agencies, and interest groups; and

Recognizing that a shared vision and comprehensive long-term planning is critical to the long-term sustainability and conservation of Anchorage forestlands.

Objectives

Secure a Sustainable Annual Budget. Secure dedicated funding specifically for the Anchorage forest management program, including staff, equipment, and contractual resources. Continue to utilize outside grant fund sources.

✓ **Critical**
*Supports ALL Goals!

Recognition of Forestland Management Plan in Anchorage 2020.

✓ **Important**

Explore Development Fees. Explore options for the establishment and implementation of development fees dedicated to the conservation and management of Anchorage public forestlands.

✓ **Important**

Attain Recognition of Forest Benefits as a Solution. Attain organizational recognition that forest benefits present valuable, legitimate, and fiscally-responsible contributions to reasonable solutions for environmental issues related to transportation, air and water quality management, sedimentation, and turbidity.

✓ **Important**

Internships. Collaborate with the universities and colleges to provide college credits to students in college approved intern programs to identify and map significant and high-value forest stands, and provide project leadership for reforestation efforts and training, and support for other develop projects.

✓ **Important**

1% For Anchorage Forestlands. Establish a fund for Anchorage Forestlands similar to the "1% for Public Art" (Municipal Code 7.40) to dedicate a portion of appropriations for capital expenditures to conservation of significant forestlands.

✓ **Important**

Outreach and Education Program. Develop and implement a public outreach/education program to communicate the value of ecosystem benefits provided by Anchorage forestlands and the financial and quality of life consequences if they are lost. It is recommended that this program include at minimum a professional quality handout/pamphlet, a presentation (e.g., PowerPoint), and a public service announcement (PSA) in video format.

✓ **Critical**
* **Supports ALL Goals!**

The program should focus on the current canopy analysis, the primary threats to Anchorage forestlands (i.e., development/ population expansion, bark beetles), estimations of environmental benefits illustrated in the benefit case studies (with an emphasis on the issues of air quality and surface water quality), and an estimate of how much forestland (tree canopy) has already been lost in the short period of time since Alaska became a state.

Collaborate with non-profits, media groups, government agencies, and others to promote and broadcast PSA's, handouts and educational materials, and presentations to civic and legislative groups.

This program can be used to generate public and legislative support for the protection of Anchorage forestlands and the inclusion of forestland considerations in planning and development processes, as well as funding and support for a comprehensive forest management program and the accomplishment of the other objectives outlined in this plan.

Branding. Develop and implement a "branded" program to support outreach and public relation activities for Anchorage forestland management (e.g., Anchorage Forestland Foundation or Friends of Anchorage Forests).

✓ **Important**

Ideally the actual development of the program will involve stakeholders and residents in the design, naming, and vision/mission establishment of the program in order to generate shared vision and enthusiasm for the project.

At minimum, the initial program should have a name, a logo, and a vision and mission statement.

The name and logo become an important part of program activities and should feature prominently in PSA's and other education materials, flyers and advertising for fundraising/charity events, trailhead signage, and new project announcements.

Non-Profit Organization. Create or partner with a non-profit 501(c) (3) organization (and an advisory committee) to accept and manage tax-deductible donations and charitable contributions dedicated to the acquisition, conservation and management of Anchorage forestlands. This could be set up as a special program within Anchorage TREErific. It is recommended that this organization be modeled similar to the Nordic Skiing Association of Anchorage (NSSA) with voluntary annual membership, Trail Pins, newsletter, and vehicle stickers in support of the "branded" program (see previous).

✓ **Important**

This organization can communicate vision, sponsor projects and training seminars, and organize and host special events to generate dedicated funding for the program. In addition, the organization can work with advocacy (e.g., TREErific Anchorage, Anchorage Trails and Greenways Coalition, Far North Bicentennial Park Trail Users) and charitable groups (e.g., Alaska Community Foundation) to generate support and funding.

"Click, Pick, Give." Make the non-profit group (see previous) an option in the Alaska Permanent Fund Dividend Charitable Contributions Program "Pick. Click. Give."

✓ **Important**

Forest Products Permits. Develop and implement a permit policy for special forest products, including firewood, Christmas trees, mushrooms, berries, cones, herbs. ✓ **Important**

Develop a separate policy to permit the harvest of dead and down timber for saw timber, poles, cabin logs, firewood, and other personal or commercial uses.

Volunteers. Collaborate and partner with individuals, user groups, Youth Employment in the Park, Native groups, non-profits, and special interest groups (e.g., Scouts, Alaska Mountain Runners, Nordic Skiing Association, Youth Restoration Corp, etc) to accomplish trail maintenance, reforestation, and other projects through volunteer efforts. ✓ **Important**

Create a Stewardship program to recognize skilled (trained) volunteers who lead these efforts.

Donation Sites. Install permanent donation boxes at major trailheads and parking areas. Where possible, include educational signage about the benefits of forestlands and an example of projects funded through donations. ✓ **Important**

Education Stations. Develop education 'stations' trailside at the two sites where benefit case studies were performed. Create and install appealing signage illustrating the type of forest and benefits per acre, including those to wildlife. Signs should also illustrate the importance of maintaining adequate canopy cover throughout the municipality and emphasize what has lost in a relatively short period of time. ✓ **Important**

Partnership. Collaborate with other departments and government organizations (e.g., AK Fish and Game, USDA Forest Service, DNR, etc.) to implement and complete projects which satisfy the goals and objectives of each group and maximize the value of available funding. ✓ **Important**























Media Relationships. Collaborate with local media to communicate specific program goals, special project and fundraising announcements, successes, and educational PSAs. ✓ **Important**

Municipal forester should seek and create opportunities to contribute articles to local newspapers and periodicals, and participate in broadcast programs thereby developing a public image, recognition, and trust within the community.

Annual Report. Develop and publicize an annual report illustrating progress on the Forestland Management Plan objectives. Include details on major accomplishments as well as unresolved issues and major roadblocks. ✓ **Important**

Table 28. Management Plan Objective Matrix

Matrix Symbol Key:  Critical  Important  Requires Identification of Significant Forests
  Supports All Goals  Supports Multiple Goals

GOALS	<i>Conserve the current level of overall tree canopy cover at no net loss and maximize the flow of benefits</i>	<i>Support smart growth and development while preserving the quality of life in Anchorage</i>	<i>Preserve recreational opportunities through responsible vegetation management along trails and other high-use areas</i>	<i>Develop a sustainable, cost-efficient forest management program</i>	<i>Date</i>
Major Objectives					
 Identify Significant Forests					Start Spring 2011
 Prioritize Areas for Conservation/Reforestation					Start Spring 2011
Planning Objectives					
  Coordinate Conservation with Community Planners					Winter 2010
 Coordinate with Physical Planning Division					Winter 2010
Regulation Objectives					
Develop Conservation Standards					Winter 2010
Regulate Activities That Threaten Health and Safety of Forestlands					Ongoing
Recognize Forestland Management Plan in <i>Anchorage 2020</i>					2020 revision
 Amend Land-Use Regulations and Standards					Winter 2010
 Revise Land Clearing Permit					Winter 2011
 Adopt Forestland Management Plan as an Element of the Comprehensive Plan					2020 revision

GOALS	<i>Conserve the current level of overall tree canopy cover at no net loss and maximize the flow of benefits</i>	<i>Support smart growth and development while preserving the quality of life in Anchorage</i>	<i>Preserve recreational opportunities through responsible vegetation management along trails and other high-use areas</i>	<i>Develop a sustainable, cost-efficient forest management program</i>	<i>Date</i>
◆ Amend Title 21, 21.07		▲			Winter 2010
◆ Amend Title 21, 21.05.080		▲			Winter 2010
◆ Amend Title 21, 21.07.080		▲			Winter 2010
Partnerships/Volunteers Objectives					
Focus Reforestation Efforts	▲				Ongoing
◆◆ Collaborate for Conservation	▲	▲			Ongoing
Internships				▲	Ongoing
Volunteers				▲	Ongoing
Management Objectives					
Fuel-Load Management (Wildfire)	●				Ongoing
Pest Management	●				Ongoing
Weed Management	●				Ongoing
Bark-Beetle Management	●				Ongoing
Beaver Damage Management	▲				Ongoing
Moose Damage Management	▲				Ongoing
Develop Tree Care Standards			▲		Winter 2010
Develop Tree Care Certification Program			▲		Summer 2011
Tree Hazard Management			▲		Ongoing
Tree Management for Trails and High-Use Areas			▲		Ongoing
Outreach Objectives					
★ Outreach and Education Program	▲	●	▲	●	Winter 2010
Bear and Moose Awareness			▲		Ongoing
Attain Recognition of Forest Benefits				▲	Ongoing

GOALS	<i>Conserve the current level of overall tree canopy cover at no net loss and maximize the flow of benefits</i>	<i>Support smart growth and development while preserving the quality of life in Anchorage</i>	<i>Preserve recreational opportunities through responsible vegetation management along trails and other high-use areas</i>	<i>Develop a sustainable, cost-efficient forest management program</i>	<i>Date</i>
Branding				▲	Winter 2011
Education Stations				▲	Summer 2011
Media Relationships				▲	Ongoing
Annual Report				▲	Winter 2011
Funding Objectives					
★ Obtain a Sustainable Annual Budget	▲	▲	▲	●	Fall 2011
Explore Development Fees				▲	Winter 2011
1% for Anchorage Forestlands				▲	Winter 2011
Non-Profit Organization				▲	Winter 2011
"Click, Pick, Give"				▲	Winter 2011
Forest Products Permits				▲	Winter 2011
Donation Sites				▲	Winter 2011
Partnerships				▲	Ongoing

Appendix A: Methods

Canopy Assessment

Methodology

For the canopy assessment, DRG acquired GIS data from MOA, in addition to the Alaska Geospatial Data Clearinghouse, Alaska Division of Forestry, and MRLC Web sites. The 2007 and 2006 aerial three-band imagery were only available for portions of the Municipality. The USGS 2007, 2006 Turnagain, and 2006 Chugiak and Eagle River aerial images were used in the canopy extraction since these images encompassed the Anchorage Bowl area, Eagle River, and Girdwood and were the most current available.

ArcGIS® and Feature Analyst® were used for the initial semi-automated feature extraction of the canopy layer. The software increased production in comparison to overall hand digitization, including a more consistent and efficient initial extraction of high-resolution images. ArcView® and ArcInfo® were used to edit and digitize canopy during the quality checking and quality assurance processes, in addition to using the geoprocessing tools to generate calculations per geographic layer.

A preliminary quality check was performed by DRG GIS technicians and specialists. Manual edits were performed at a scale of 1:2500, where 1 inch equaled approximately 200 feet. Areas of over-estimation of canopy (e.g., lawns and impervious surfaces) were deleted, while grossly missed canopy were manually digitized using polygons and buffered points to fill in gaps where omissions were discovered. Three total accuracy assessments were performed.

Following the final quality analysis/check process, the DRG canopy extractions were merged into a final file geodatabase and acreage calculations were generated using ArcGIS® geoprocessing, analysis, and data management tools. Canopy acreages were calculated for Anchorage Bowl, Eagle River, and Girdwood. In addition, canopy acreages were also calculated for land use, land ownership, hydrology, trails, parks, and rights-of-way within each of these areas and for the overall MOA area. The right-of-way layer was created by DRG using the parcel layer provided by MOA to generate a pseudo-parcel feature, buffering the local, secondary, and major roads by 30, 40, and 50 feet on center, respectively, then merging and dissolving the two data layers. For the remaining canopy outside of the DRG extracted areas, the MOA land cover data and NLCD canopy layers were clipped and merged to provide an overall canopy cover for the entire MOA (Figure 40).

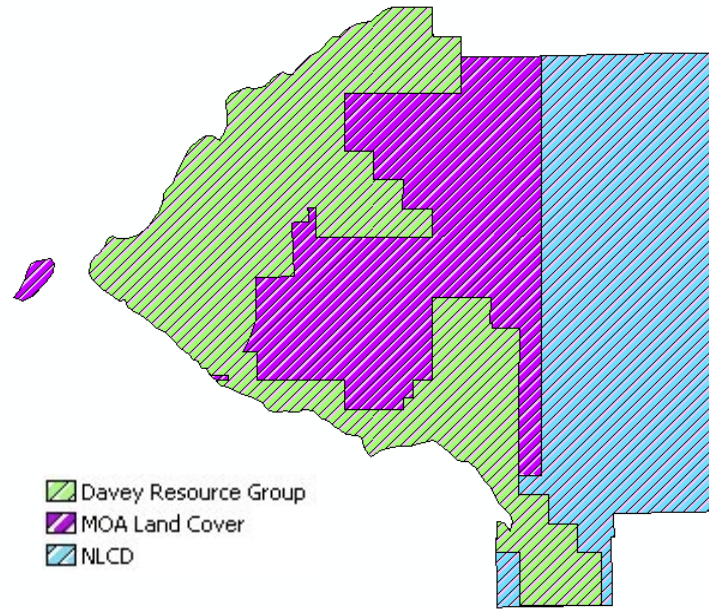


Figure 40. Source data for canopy analysis

Aerial Imagery Source Data

- 2007 USGS aerial image (~1ft resolution) (Figure 41)
 - The image encompassed only the western side
 - The image was broken up into manageable grids for processing (46 total)
 - Eight (8) grids had poor image quality
 - The data for each grid was merged and dissolved to the final canopy layer

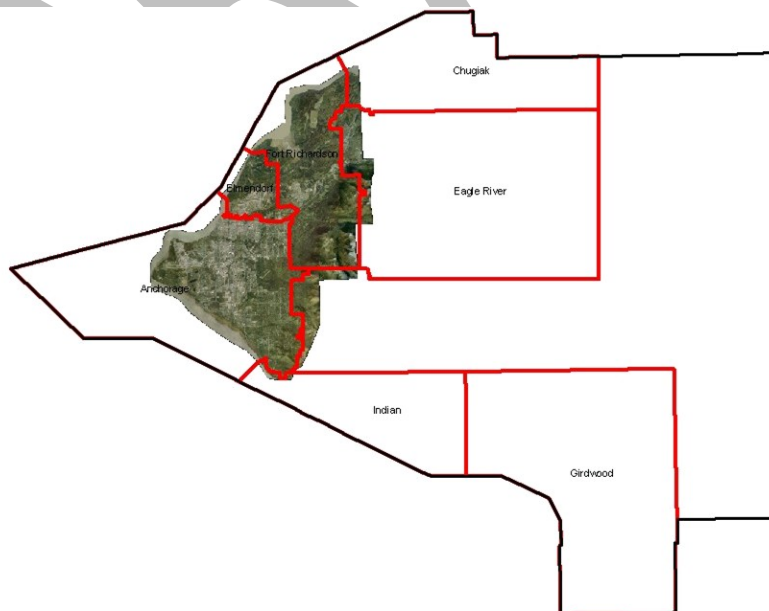


Figure 41. Extent of 2007 USGS aerial imagery

- 2006 Turnagain aerial image (1.5 ft resolution) (Figure 42)
 - The image encompassed the southern area of MOA only
 - The image was broken up into manageable grids for processing (12 total)
 - A small location was not captured due to the extents of the image (used MOA LC data)
 - The data for each grid was merged and dissolved to the final canopy layer

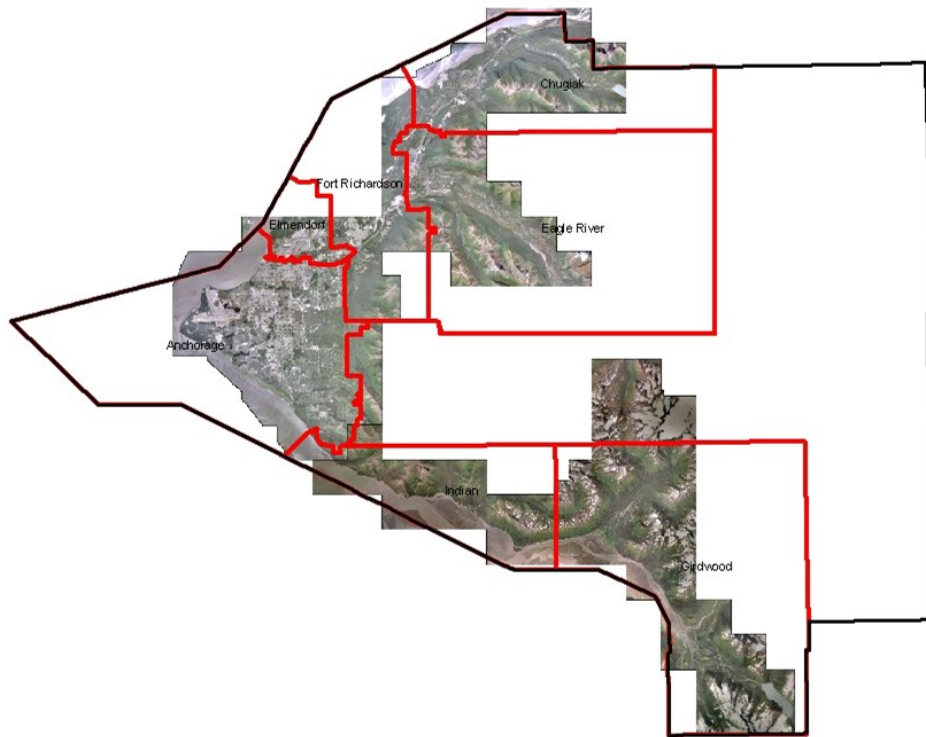


Figure 42. Extent of 2006 Turnagain and Chugiak/Eagle River aerial imagery

- 2006 Chugiak and Eagle River aerial image (1.5 ft resolution) (Figure 42)
 - The image encompassed the northern area of MOA only
 - The image was broken up into manageable grids for processing (16 total)
 - A small location was not captured due to the extents of the image (used MOA LC data)
 - The data for each grid was merged and dissolved to the final canopy layer
- MOA Land Cover Layer
 - Data was used in areas of non-extracted DRG canopy
 - All DRG extracted canopy were combined with the MOA LC in order to identify the species class
 - National Land Cover Data (NLCD)

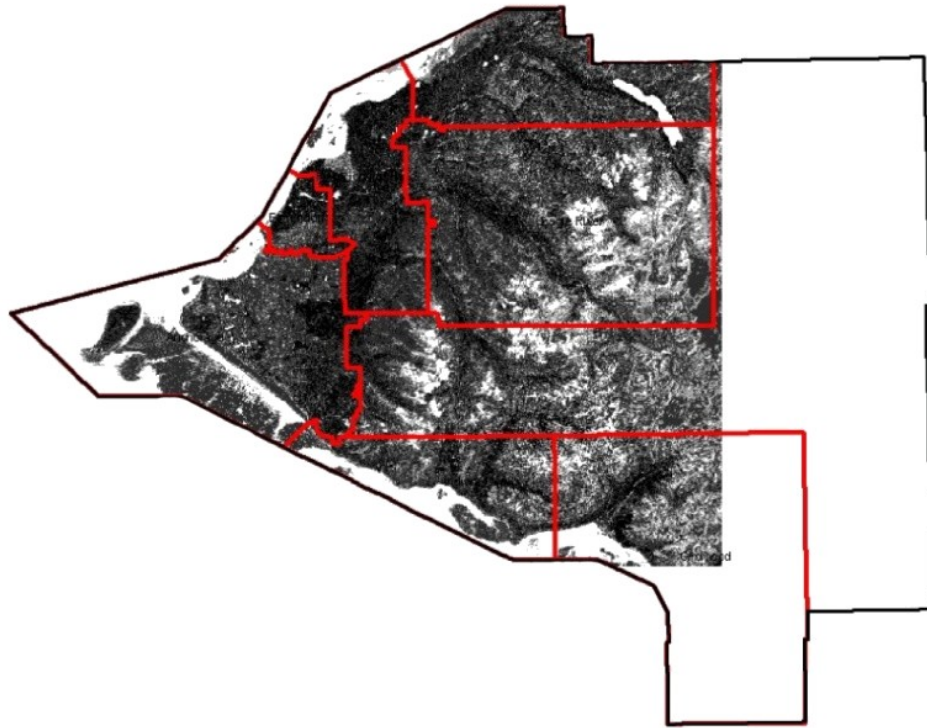


Figure 43. Extent of MOA Land Cover Layer

- National Land Cover Data (NLCD)
 - Data was obtained for the remaining areas outside of the MOA LC and DRG extracted canopy areas

MOA GIS Boundary Layers

Provided by MOA in GDB on external HDD

- Overall MOA Boundary – with coastal water areas included
- Community Council Boundaries – does not include coastal waters and had detailed community boundaries for the Anchorage Bowl, Eagle River, and Girdwood
- MOA Land Cover data
- MOA Parks
- Chugach State Park and National Forest
- Land Use (provided by MOA in GDB on external HDD)
- Legacy Streams –encompassed entire area
- Lakes
- HLB Parcels

Provided by MOA – downloaded from FTP site

- Parcel Ownership – (downloaded from City FTP site)

MOA GIS Web site – downloaded

- Trails – most current data available (downloaded from MOA Web site)

MRLC Web site

- NLCD data

ESRI StreetMap – Detailed Area layer

- Detailed MOA Boundary – does not include coastal waters

Limitations

A lack of consistent data sources throughout the overall MOA project area was the greatest limiting factor, including large expanses without GIS information on land use and/or ownership, different types and quality of imagery, and different sources/resolution of species composition. DRG worked with the best available datasets that were provided by the client, in addition to the data obtained and available through other sources.

No current (less than five years) color infrared imagery or LIDAR data was available. With only three-band imagery available, some extractions were overestimated and underestimated with the limitation of discrete color bands, shadows of features and elevation change, and color differences in the processed image. Quality checks and manual editing were performed to correct most of these errors due to the image quality limitations where the accelerated feature extraction (AFE) software was unable to discern specific canopy features. The use of secondary sources like the Map2Google tool in ArcGIS® and Microsoft's Birds Eye View were limited in use for most areas due to the imagery available. No field verification was performed.

A second limitation was due to the size of the project area where maximum file size limitations and processing issues were encountered. To resolve this issue, the images were broken into smaller image tiles using LizardTech GeoExpress® software for faster and more efficient processing. Canopy was extracted per image tile and the results were later merged, dissolved, and clipped when necessary. Due to file size limitations in shapefile and personal geodatabase files, the overall canopy cover had to be merged in a file geodatabase for the final deliverable.

Accuracy Assessment

A total of three accuracy assessment processes were performed by randomly generating 100 points within the areas where DRG extracted canopy, using the Random Points in Polygon tool. The results are defined below:

- **Preliminary QA/QC process (included Anchorage and Turnagain area)**
Out of 100 points generated, 32 were identified to be within canopy and 68 were non-canopy. Of the 32 points identified to be within canopy, 29 were also within the DRG canopy layer for a 90.625% accuracy rating. Of the 68 outside of canopy, all points were correctly identified for a 100% accuracy rating. A second quality check was performed after identifying results of the accuracy assessment.
- **Second QA/QC process (included all areas where imagery was available)**
Out of 100 points generated, 44 were identified to be within canopy and 56 were non-canopy. Of the 44 points identified to be within canopy, 42 were also within the DRG canopy layer

for a 95.45% accuracy rating. Of the 56 outside of canopy, four points were possibly incorrectly identified for a 90.9% accuracy rating. The four incorrectly identified random points were within the mountain areas, shadows, or low-lying vegetation.

- **Third QA/QC process (within canopy extractions only)**

Out of 100 points generated within DRG's canopy layer, 96 were identified to be within canopy and four were non-canopy for a 96% accuracy rating.

Benefits Case Studies

The benefit case studies considered in the Anchorage Forestland Assessment (Chapter 3) are based on analysis of two current inventories using *i-Tree Streets, a STRATUM Analysis Tool* (*Streets* v 3.0.13; i-Tree v 3.0.16). *Streets* is a component of the i-Tree suite of software tools developed by the USDA Forest Service in cooperation with The Davey Tree Expert Company and other cooperators. While *Streets* is intended to be applied to urban tree populations rather than forestlands, it was considered to be the best available option for estimating Anchorage forest benefits based on the scope and resource availability of this project. In addition, the scarcity of specific regional data related to tree benefits in Alaska climate zones was a major factor in the consideration to not pursue more sophisticated analysis methods.

While *Streets* is not specifically intended for this particular application, this constantly evolving, peer-reviewed software does provide a scientific foundation for calculating the economic benefits of trees and can help to promote a better understanding of the benefits and services provided by Anchorage's community forestlands. The state-of-the-art research supporting the benefit analysis provides a scientific foundation in support of the following annual ecosystem benefits:

- **Stormwater** benefits are calculated based on species and stem diameter at breast height (DBH) and is a consideration of the amount of stormwater intercepted by tree canopy. The intercepted stormwater then is used by the tree to support physiological processes, is evaporated from leaf surfaces, and/or is percolated into soil from stem flow. Canopy interception also reduces the impact of rain events on soils and tree roots and other organic matter (e.g., leaves, twigs, and shed bark) increase infiltration rates and stabilize soils, helping to prevent stormwater runoff and pollution in surface waters from non-point sources. The value (\$) of stormwater benefits is based on the per-gallon cost to treat stormwater.
- **Air quality** benefits (calculated from species and stem DBH) are equal to the sum value (\$) of air pollutants (NO₂, SO₂, O₃, and PM₁₀) that are deposited on tree canopy surfaces. These pollutants are either absorbed by the canopy or harmlessly washed to the soil surface in rain events. Values relative to reduced pollution emissions from energy generation (based on canopy shading and energy use reduction), a consideration of *Streets* air quality benefits, were omitted from the Anchorage case studies based on climate considerations and the location of the inventory sites relative to urban structures.
- **Carbon dioxide** reduction (calculated from species and stem DBH) is the sum of decreased atmospheric CO₂ as a result of sequestration by trees. Values relative to reduced emissions from power plants resulting from reduced electrical use/generation were not considered in this study. CO₂ release contributions resulting from maintenance activities were also omitted because the sample sites are wildland forests and not subjected to maintenance, other than that required to abate hazardous conditions adjacent

to trails. *Streets* calculates CO₂ reduction based on species, size, and climate region and quantifies the value (\$) based on the cost to reduce CO₂ through other methods

- **Replacement value** is a reflection of current population numbers, species, stature, location, and condition. There are several methods available for obtaining a fair and reasonable perception of a tree's value (CTLA, 1992; Watson, 2002). The cost approach used in *Streets* analysis assumes the value of a tree is equal to the cost of replacing the tree in its current state (Cullen, 2002). Because of the approximations used in these calculations, replacement values are first-order estimates for the population and are not intended to be definitive on a tree-by-tree basis (*Streets*). The replacement value should not be confused with the timber value of a specific forest stand and, instead, is a consideration of the flow of environmental benefits that are a reflection of species and tree size. In other words, maintaining (or replacing) the flow of benefits quantified from a specific forest stand would require a replacement stand of similar species and size.

The case study inventories were collected by State of Alaska Community Forestry personnel. Each sample was collected as a complete inventory at that site and included details about each tree's location, species, size, and condition. The data was then formatted for use in *Streets*. The project file was formatted to use the North Climate Zone and default benefits (\$) values, based on the consideration of the project team and recommendation from the i-Tree support team (Maco 2010).

Appendix B: Reference

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Appendix C: Tables

Municipality of Anchorage Municipal Parks	Canopy (Acres)	Total Area (Acres)	Canopy %
Anchorage Bowl Parks			
A/C Couplet Buffer Park	1.15	2.95	39.11%
Abbott Loop Buffer Park	0.06	0.23	26.44%
Al Miller Park	0.71	0.97	72.69%
Alaska Botanical Garden	71.27	81.10	87.88%
Alderwood Park	0.58	0.60	96.42%
Anchorage Rotary/Eisenhower Memorial	0.00	0.09	3.46%
Anchorage Town Square Park	0.31	1.69	18.36%
Arctic Circle Park	0.27	0.28	97.38%
Arctic/Benson Park	0.90	2.02	44.36%
Arnold L Muldoon Park	50.26	67.35	74.62%
Atwood Park	0.03	0.09	37.49%
Balto Seppala Park	3.94	17.93	21.95%
Barrow Park	0.31	0.66	47.13%
Baxter Bog Park	31.87	65.15	48.92%
Bayshore Park North	10.41	10.85	95.94%
Bayshore Park South	9.02	10.60	85.12%
Ben Crawford Memorial Park	0.56	1.01	56.01%
Bentzen Lake Park	4.18	10.50	39.79%
Bob and Arlene Cross Park	5.59	9.19	60.82%
Brown's Point Park	0.20	0.57	34.11%
Campbell Creek Greenbelt	163.37	291.17	56.11%
Campbell Park	0.88	2.03	43.23%
Carl Park	0.59	0.75	78.32%
Carlson Park	0.49	2.36	20.57%
Carr-Gottstein Park	5.43	12.91	42.05%
Castle Heights Park	0.42	1.38	30.23%
Centennial Park	47.47	73.32	64.74%
Charles W Smith Memorial Park	12.82	14.05	91.25%
Cheney Lake Park	14.78	45.18	32.72%
Chester Creek Greenbelt	264.88	460.07	57.58%
Chugach Foothills Park	5.03	11.36	44.25%
Clay Park	1.22	1.32	92.18%
Coffey Park	0.04	0.09	51.40%
Connors Lake Park/Connors Bog Park	85.68	256.34	33.42%
Cope Street Park	0.37	0.66	55.70%
Creekside Park	1.70	8.43	20.20%
Cunningham Park	0.00	0.05	0.00%
Cutty Sark Park	0.51	0.80	63.24%
Dave Rose Park	2.62	14.81	17.67%
David Green Memorial Park	0.89	2.88	30.97%
Davidson Park	6.16	7.40	83.21%
Davis Park	48.21	88.16	54.68%
DeLong Lake Park	12.20	19.18	63.60%
Didlika Park	0.09	0.40	21.74%
Duldida Park	0.15	0.58	25.37%
Earl and Muriel King Park	0.17	0.91	18.19%
Earthquake Park	96.66	127.35	75.90%
East Northern Lights Buffer	0.28	0.51	55.51%
Echo Park	10.79	13.92	77.53%
Edna M Fisk Memorial Park	0.59	0.62	95.77%
Elderberry Park	0.50	1.48	33.99%
Explorers Park	0.06	0.17	38.10%
Fairbanks Park	0.02	0.32	6.41%

Municipality of Anchorage Municipal Parks	Canopy (Acres)	Total Area (Acres)	Canopy %
Fairview Park	0.07	0.96	7.40%
Fairview Recreation Center Park	0.09	2.07	4.23%
Far North Bicentennial/Hillside Park	3458.34	4316.00	80.00%
Fish Creek Estuary	7.84	29.96	26.15%
Fish Creek Greenbelt	13.63	21.18	64.35%
Folker Park	1.82	2.01	90.78%
Forsythe Park	23.29	26.95	86.43%
Foxhall Park	2.56	3.98	64.25%
Frontier Land Park	0.11	1.99	5.53%
Furrow Creek Greenbelt	3.20	4.54	70.37%
Gladys Wood Park	15.45	25.81	59.86%
Goose Lake Park	17.35	18.65	93.04%
Hamilton Park	0.55	1.77	31.10%
Harvard Park	1.45	5.34	27.24%
Helen Louise McDowell Sanctuary	8.72	13.93	62.59%
Henson Park	0.01	0.40	2.42%
High Tide Park	1.60	1.60	100.00%
Hills Park	0.30	0.41	73.08%
Huffman Park	8.80	11.48	76.64%
Iliamna Park	0.21	0.25	84.40%
Independence Park	5.58	8.09	69.04%
Ira Walker Park	4.95	7.43	66.61%
J.B. Gottstein Park	2.35	3.37	69.64%
Jacobson Park	8.45	10.30	82.10%
Jade Street Park	2.38	13.93	17.08%
James Vernon Nash Park	1.93	2.27	85.03%
Javier DeLa Vega Park	5.92	36.33	16.29%
Jewel Lake Park	13.66	28.30	48.28%
Johns Park	39.75	58.64	67.79%
Kanchee Park	0.82	2.22	36.72%
Karluk Park	0.17	5.46	3.17%
Kedaya Park	0.22	0.24	89.69%
KFQD Park	1.57	8.12	19.33%
Kincaid Park/Point Campbell	1043.62	1501.83	69.49%
Kiwanis Fish Creek Park	0.28	0.80	35.75%
Kobuk Park	4.00	4.95	80.86%
LaHonda Park	0.63	0.77	82.27%
Lake Otis Buffer Park	0.73	2.25	32.37%
Lake Otis Park	0.32	0.53	59.74%
Linden Park	3.37	3.94	85.60%
Little Campbell Creek Greenbelt	8.73	12.55	69.55%
Little Dipper Park	0.41	2.54	16.23%
Little Rabbit Creek Bluff Park	56.73	68.68	82.60%
Little Rabbit Creek Greenbelt	2.08	2.53	82.35%
Lloyd Steele Cooperative Park	1.06	5.05	21.05%
Lloyd Steele Park	5.88	8.92	65.93%
Lore Park	0.41	4.71	8.71%
Lyn Ary Park	3.68	11.37	32.36%
Lynnwood Park	2.06	2.56	80.21%
Lynwood Park	0.47	0.79	60.20%
Margaret Egan Sullivan Park	0.71	1.05	67.39%
Marston Park	0.29	0.38	75.93%
Meadow Park	0.45	1.06	42.51%
Meadow Street Park	3.51	8.29	42.33%
Mesa Verde Buffer Park	1.47	1.83	79.95%
Minnesota Park	0.05	2.42	2.06%
Moen Park	3.49	10.00	34.88%
Morton Park	0.51	0.70	73.01%

Municipality of Anchorage Municipal Parks	Canopy (Acres)	Total Area (Acres)	Canopy %
Muldoon Community Park	6.47	11.49	56.25%
Muriel Park	0.07	0.19	38.38%
Nadine Park	2.01	2.44	82.31%
Nadine Street Park	0.53	0.68	77.39%
Nancy Park	0.00	1.07	0.00%
Needle Park	0.00	0.05	3.39%
Nelva J Wilmoth Park	1.85	2.04	91.01%
New Seward Park	0.10	0.11	94.24%
Nichols Park	0.08	1.28	6.04%
Nickleen Park	1.16	1.59	72.74%
Northwood Park	5.71	14.73	38.75%
Nulbay Park	0.05	0.45	10.77%
Nunaka Valley Park	8.18	9.07	90.12%
Nunaka Valley Park North	1.13	5.34	21.11%
Nunaka Valley Park South	15.55	28.23	55.09%
Oceanview Bluff Park	10.21	66.39	15.37%
Oceanview Park	4.77	7.03	67.79%
Old Hermit Park	0.13	0.15	85.43%
Orca Park	0.15	0.35	43.61%
Pamela Joy Lowry Memorial Park	6.12	8.69	70.36%
Papago Park	0.42	1.88	22.34%
Park Strip	2.24	29.30	7.65%
Peratrovich Park	0.16	0.45	35.80%
Petes Park	0.15	0.20	77.82%
Pioneer Park	0.18	4.95	3.63%
Pleasant Drive Park	0.30	0.35	86.21%
Point Woronzof Overlook	6.90	22.60	30.51%
Point Woronzof Park	106.37	191.82	55.45%
Pop Carr Park	4.61	8.15	56.64%
Potter Creek Ravine Park	8.86	10.97	80.75%
Quyana Park	0.23	1.79	13.02%
Rabbit Creek Greenbelt	138.56	174.82	79.26%
Rabbit Creek Park	13.67	18.44	74.13%
Resolution Park	0.27	0.74	36.46%
Roosevelt Park	0.12	0.54	21.70%
Rovenna Park	0.54	1.65	32.99%
Russian Jack Springs Park	224.33	303.96	73.80%
Ruth Arcand Park	336.12	535.37	62.78%
San Antonio Park	0.27	0.90	29.83%
Sand Lake Park	4.81	5.16	93.27%
Scenic Park	2.82	4.50	62.71%
Seward Highway Buffer Park	2.40	3.58	67.06%
Shady Birch Park	1.29	1.92	67.23%
Ship Creek Overlook Park	0.06	0.65	9.54%
Shoeshoe Park	1.58	2.53	62.60%
Sisterhood Park	0.00	3.51	0.00%
Sisterhood/Brotherhood Park	0.00	3.23	0.00%
Snowshoe Park	1.80	2.48	72.36%
South Anchorage Park	58.12	68.96	84.28%
South Anchorage Sports Park	1.68	61.24	2.75%
South Patterson Park	1.78	2.95	60.27%
Southport Park	0.95	8.45	11.25%
Southwood Park	1.00	1.29	77.52%
Spenard Beach Park	1.10	7.90	13.87%
Spenard Recreation Center Park	0.00	3.16	0.00%
Springer Street Park	1.69	4.65	36.37%
Spruce Park	5.89	9.04	65.14%
Standish Street Park	0.08	0.24	35.70%

Municipality of Anchorage Municipal Parks	Canopy (Acres)	Total Area (Acres)	Canopy %
Stanley Park	0.58	1.01	57.92%
Stephenson Street Park	0.68	1.37	49.49%
Stonegate Park	1.48	3.62	40.81%
Storck Park	6.26	19.99	31.30%
Sunset Park	1.36	5.58	24.33%
Suzan Nightingale McKay Memorial Park	0.08	1.75	4.56%
Taku Lake Park	4.61	5.87	78.60%
Taku School Park	1.63	2.12	77.11%
Telequana Park	2.32	3.20	72.65%
The Cuddy Family Mid-Town Park	1.32	16.31	8.12%
Tikishla Park	1.29	1.44	89.58%
Timberlane Park	6.61	11.09	59.62%
Turinski Park	3.71	4.30	86.16%
Turnagain Refuge Park	3.26	57.16	5.70%
Turpin Park	0.81	4.29	18.91%
University Lake Park	27.32	64.24	42.53%
University Park	2.33	2.81	83.07%
unknown	70.87	170.44	41.58%
Valley of the Moon Park	1.17	1.35	86.66%
Valley Park	1.84	2.77	66.44%
W. B. Lyons Park and Mountain View Recreation Center	0.07	2.33	3.11%
Ware Park	0.68	0.96	71.65%
Westchester Lagoon Park	0.39	3.95	9.92%
Whitehall Street Park	0.13	0.27	48.36%
Wickersham Park	5.58	7.24	77.05%
Willawaw/San Roberto Park	3.17	8.35	37.94%
Wilson Street Park	1.58	2.06	77.09%
Winchester Park	2.26	4.76	47.60%
Winderness Park	0.73	0.87	84.59%
Wolverine Park	1.49	2.82	52.74%
Wonder Park Pathway	0.30	0.39	77.95%
Total Anchorage Bowl Parks	6926.25	10159.60	68.17%
Eagle River/Chugiak Parks			
Beach Lake Park	775.44	1580.45	49.06%
Eagle River Commons	0.13	7.95	1.68%
Eagle River Lions Park	4.02	34.47	11.67%
Eagle River Town Square Park	0.12	0.88	14.06%
Eklund Park	0.24	0.24	100.00%
Eliassen Park	0.55	2.02	27.35%
Fire Lake Recreation Center Park	1.95	10.24	18.99%
Glen Eagle Park	0.16	0.43	37.69%
Hillcrest Park	0.08	0.43	18.21%
Homestead Park	0.99	1.44	68.90%
Hylen Crest Park	34.40	44.92	76.58%
Lampert Park	0.61	0.66	92.70%
Loretta French Park	49.58	99.33	49.91%
Lower Fire Lake Island Park	0.75	1.01	74.70%
Marianna Koehler Memorial Park	0.08	0.33	25.24%
Mink Park - Greenbelt	1.30	1.33	97.28%
Mirror Lake/Edmonds Lake Park	444.41	494.63	89.85%
Mountain Ash Park	0.05	0.07	73.75%
Mouth of Peters Creek Park	14.86	21.81	68.13%
New Glenn Hwy Buffer Park	0.56	0.79	70.55%
Oberg Park	1.58	4.98	31.66%
Palos Verdes Park	0.09	0.17	50.26%
Peters Creek Park	42.36	49.10	86.27%
Ramsey Park	7.10	7.70	92.16%

Municipality of Anchorage Municipal Parks	Canopy (Acres)	Total Area (Acres)	Canopy %
Russel's Field	0.60	13.27	4.49%
Schroeder Airstrip Park	0.94	6.12	15.30%
Section 25	116.10	143.25	81.04%
South Fork Park	8.49	10.39	81.68%
Spirit Park	0.99	2.36	42.22%
Targhee Park	0.35	0.79	44.76%
Tonjess Park	3.59	6.45	55.71%
Turner Park	0.00	0.63	0.00%
Unknown	40.73	52.24	77.95%
Total Eagle River/Chugiak Parks	1553.19	2600.88	59.72%
Girdwood Parks			
Alpine Park	1.79	2.08	86.16%
Alyeska Basin Park	2.50	3.01	82.90%
Alyeska Basin Park Reserves	11.24	18.66	60.23%
Banff Park	1.74	1.85	94.22%
California Creek Park	9.94	12.52	79.36%
Girdwood Lions Park	0.66	0.86	76.81%
Girdwood Park	3.74	7.17	52.12%
Girdwood Town Square Park	0.74	0.78	94.79%
Girdwood Town Square Buffer Park	0.73	0.84	86.35%
Moose Meadow Park	30.37	92.30	32.91%
Total Girdwood Parks	63.43	140.06	45.29%
Other Parks			
Bird Creek Park	8.98	10.00	90.00%
Bird Creek Regional Park	836.42	1016.76	82.00%
Total Other Parks	845.40	1026.75	82.34%
Total All MOA Parks	9388.26	13927.29	67.41%

Appendix D: Maps Illustrating Federal, State, and Municipal Ownership and Land Use

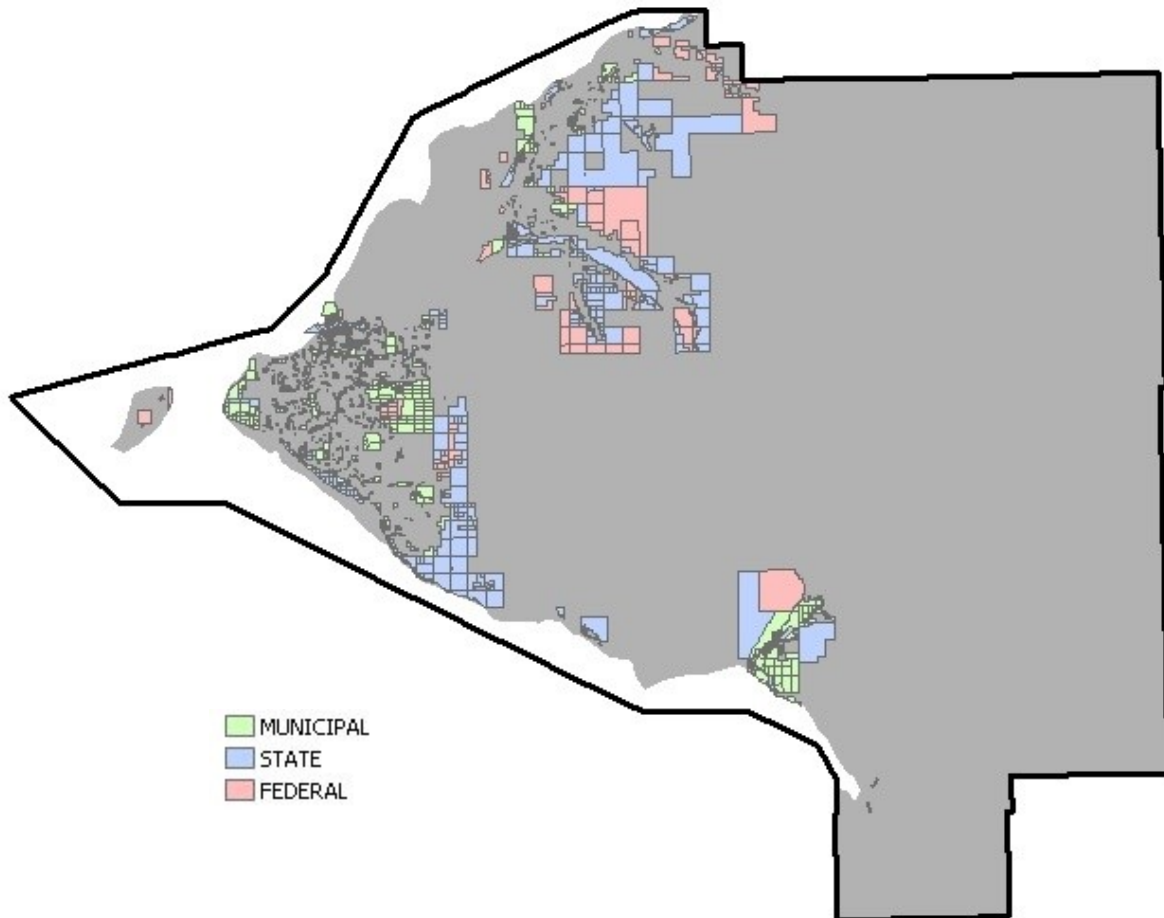


Figure 44. Municipality-wide: federal, state, and municipal parcels

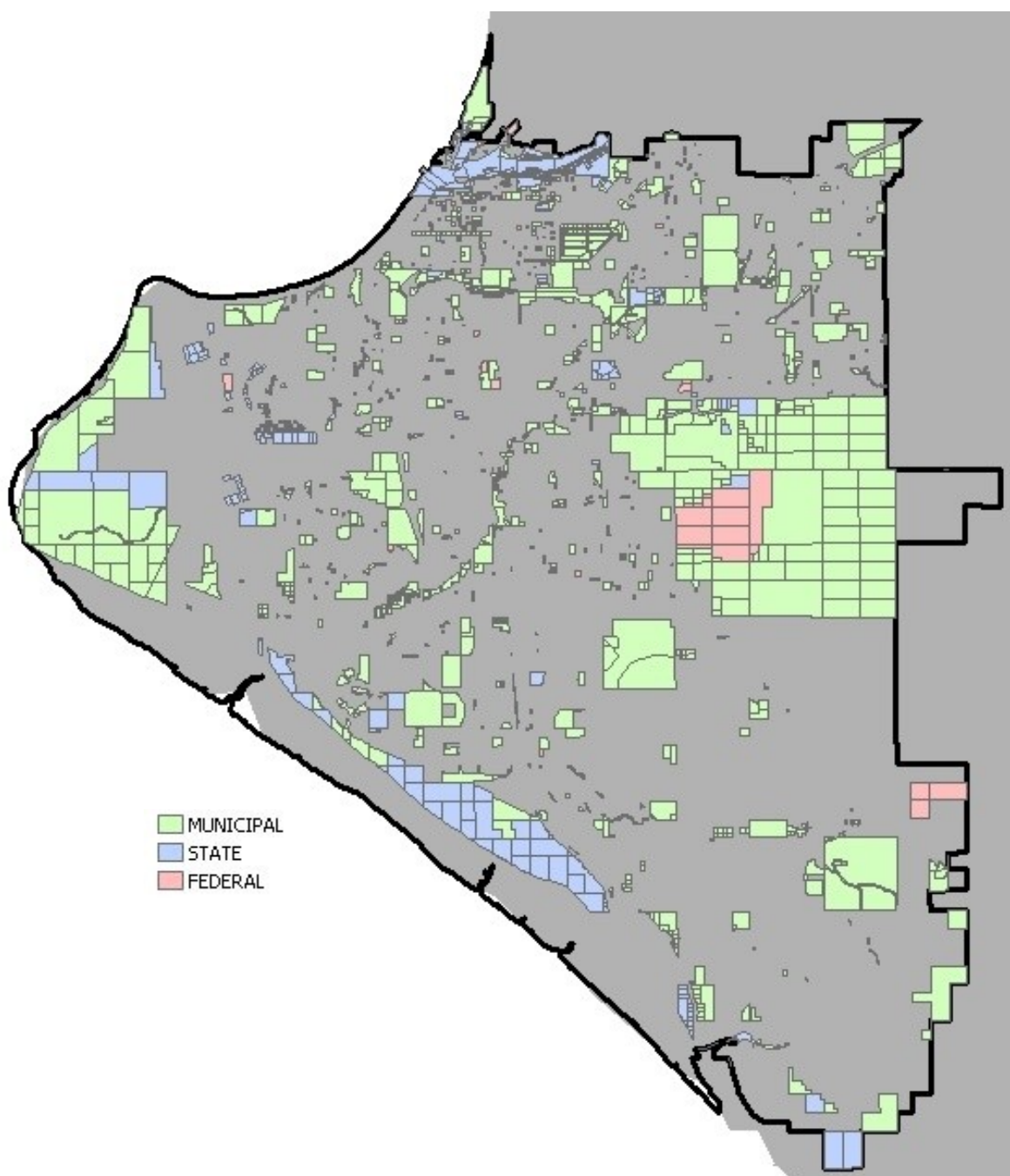


Figure 45. Anchorage bowl: federal, state, and municipal parcels

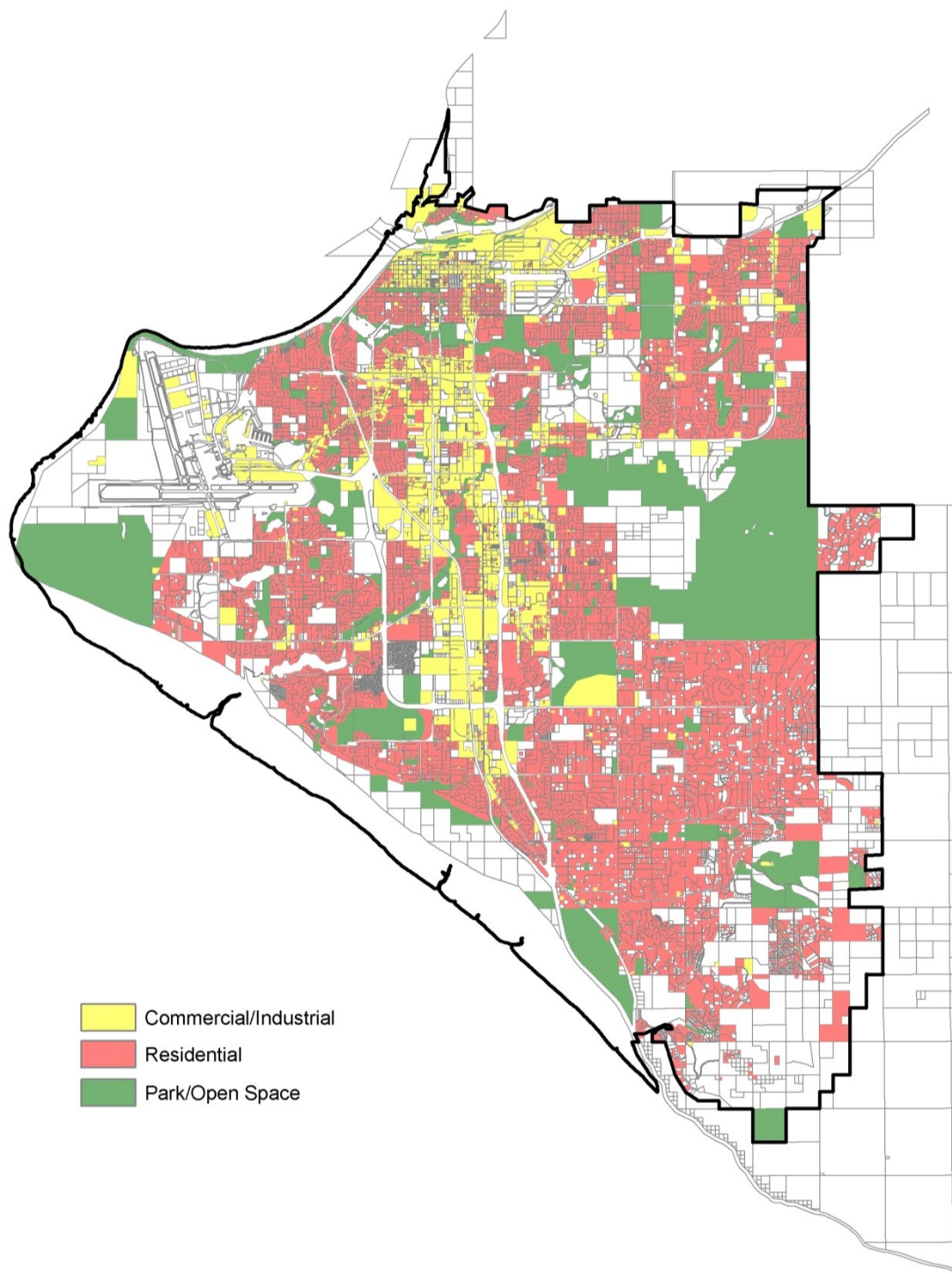


Figure 46. Anchorage bowl land-use

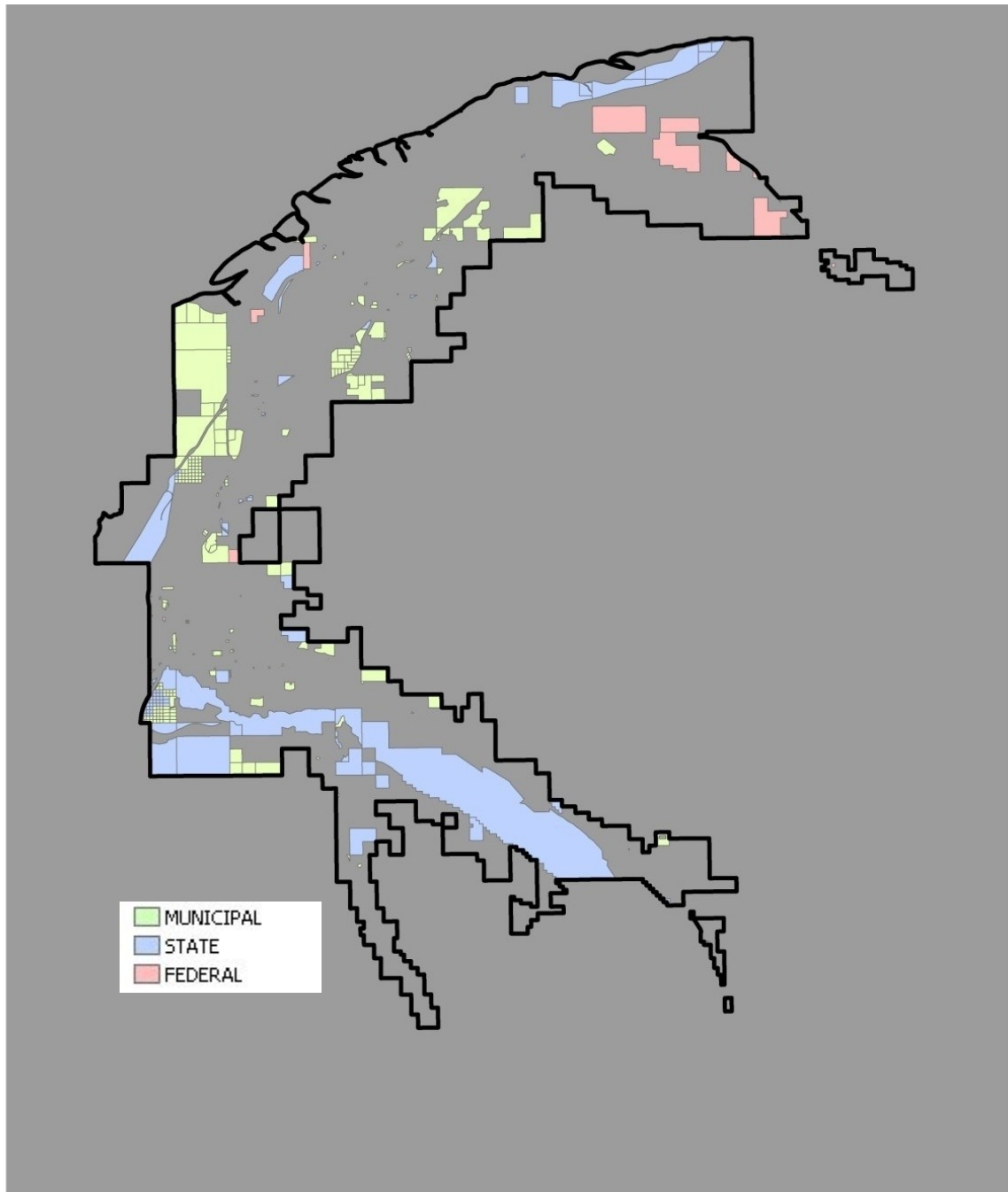


Figure 47. Eagle River/Chugiak: federal, state, and municipal parcels

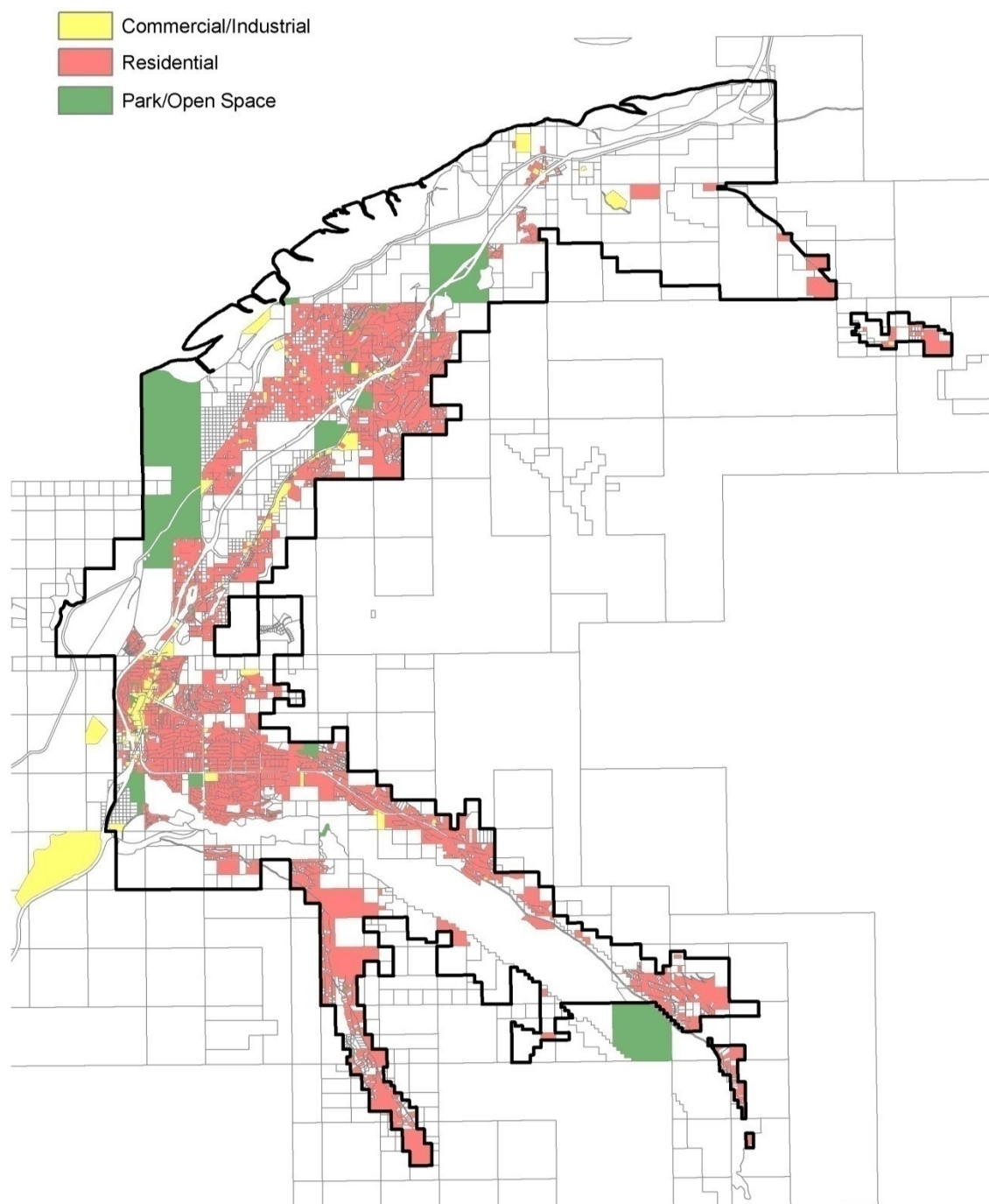


Figure 48. Eagle River/Chugiak land use

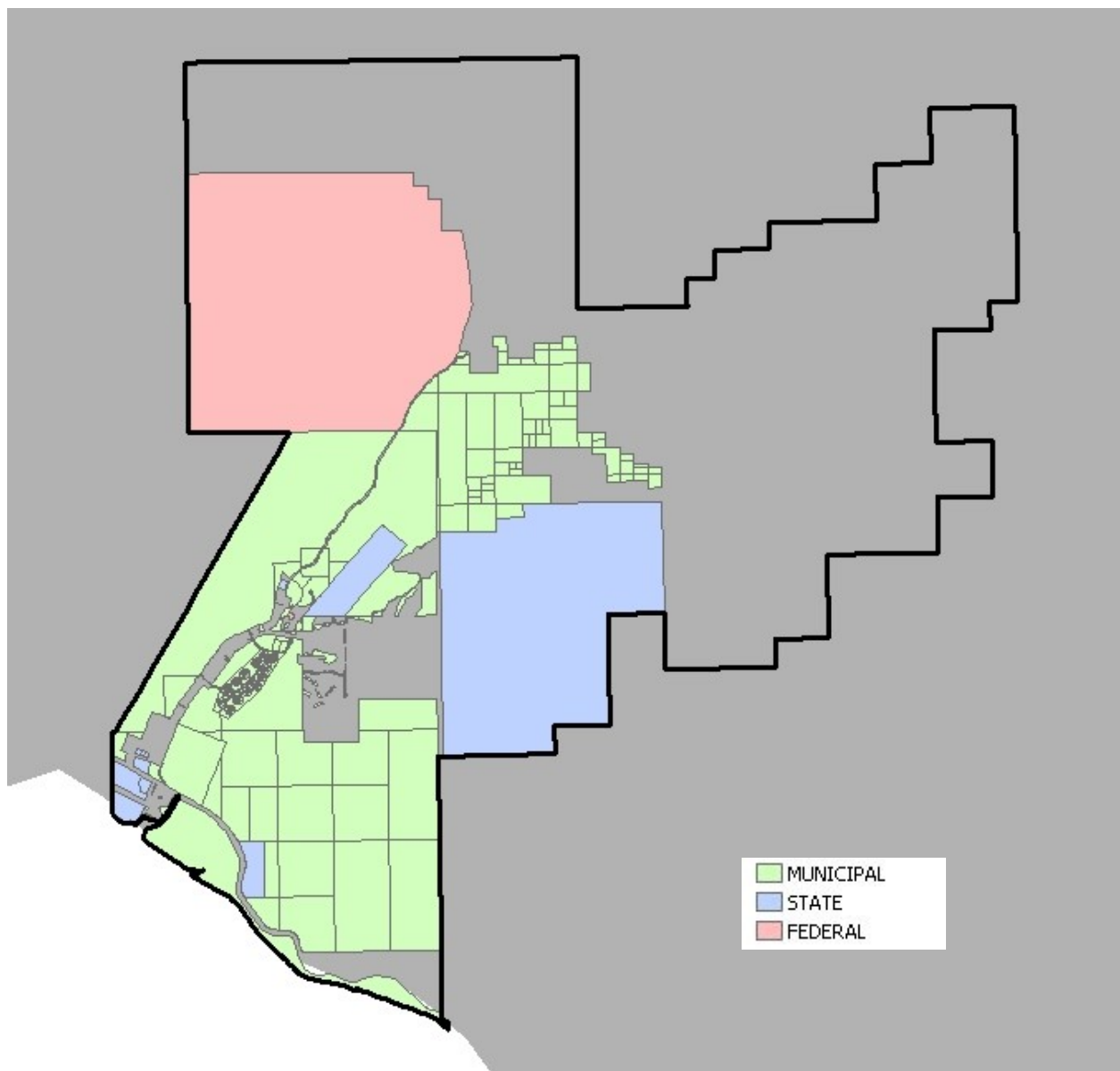


Figure 49. Girdwood: federal, state, and municipal parcels

Appendix E: Online Survey Details and Results

The public survey was developed and administered online using Survey Monkey™ (www.surveymonkey.com). The questions (see Chapter 2) were developed by DRG, in conjunction with municipal and state community forestry officials. Public outreach included a media release sent to all local media, and email invitations sent to individuals and e-list members of the following groups and agencies:

AK Assoc of General Contractors; AK Assoc of Realtors; AK Botanical Garden; AK Cabaret, Hotel, Restaurant, and Retailers Association; AK Community Forest Council; AK Department of Fish & Game; AK Department of Natural Resources (Forest Entomologist, Community Forestry Resources Program Manager, Conservation Education, Stewardship Forester); AK Department of Transportation (ROW chief, Design and Construction Standards, State Environmental Manager); AK Home Builders Association; AK Master Gardeners; AK National Park Service; AK Native Plant Society; AK Process Industry Careers Consortium; AK Railroad; AK Resource Development Council; AK Sled Dog Racing Association; Alaska Center for the Environment; American Society of Landscape Architects; Anchorage Assembly; Anchorage Audubon Society; Anchorage Boy Scouts; Anchorage Chamber of Commerce President; Anchorage Convention and Visitors Bureau; Anchorage Cooperative Weed Management Area; Anchorage Economic Development Corporation; Anchorage Federation of Community Councils; Anchorage Girl Scouts; Anchorage Mayor; Anchorage REI; Anchorage School District Maintenance; Anchorage School District superintendant; Anchorage Senior Center; Anchorage Soil and Water Conservation District; Anchorage Waterways Council; Army Corps of Engineers (Plant Ecologist, etc.); Arctic Bike Club; Balance Alaska; Bike Commuters of Anchorage; BLM; Campbell Creek Science Center; Carlos Tree Service; Certified Arborists in MOA; Chugach National Forest; Chugach State Park; Chugach Tree Service; Committee for Noxious and Invasive Plant Management Listserv; Community Sustainability listserv; Cook Inlet Regional Corp; Ducks Unlimited; Eklutna INC; Fort Richardson; Gage Tree Service; Great Land Trust; Heritage Land Bank; Mental Health Trust Land office; Mountain View volunteers; Municipality of Anchorage (Horticulture Dept., Creeks Manager, Fire Dept., Planning, Watershed Mgmt., Parks, etc.); Nordic Skiing Association of Anchorage; Northwest Landscapes; Parks and Recreation Commission; Paul's Tree Service; Realtors; SC Utility Assoc; Sierra Club; Society of American Foresters; South Central Region Director Alaska Small Business Development Center; Tall Trees Tree Service; The Boutet Company; TREERific Anchorage; UAA (grounds maintenance, land management, etc.); UAF Cooperative Extension; USDA Forest Service (Forest Health Protection, Invasive Plant, Weed, Agricultural Pests Programs, etc.); US Fish and Wildlife Service; US Geological Survey; What's up e list

Figure 50. Media release sent to local media

Tom Irwin
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STATE OF ALASKA
DEPARTMENT OF
NATURAL RESOURCES

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Press Release

COMMISSIONER'S OFFICE

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Division of Forestry Community Forestry Program

Anchorage Urban Forest Management Plan and Survey

(Anchorage, AK) – The Alaska Division of Forestry, Community Forestry Program and the Municipality of Anchorage invite the public to complete a short online survey on how they use and what they value in forested parks in Anchorage. Responses will be used to develop a management plan that will help maximize benefits and services from undeveloped forest land.

The plan will identify how much of Anchorage is covered by trees through an urban tree canopy analysis, the first study of its kind in Alaska. Urban tree canopy is important because the greater the canopy coverage, the greater the benefits provided. Through mapping and analyzing data about the distribution and condition of the forest the municipality will be better able to identify and reduce threats from fire, insects, disease, and other destructive agents. The plan will also identify priority areas for conservation and cost effective methods to manage forest lands.

"Forests are among the most effective and least costly elements of city infrastructure," said Stephen Nickel, Community Assistance Forester with the Alaska Division of Forestry, Community Forestry Program. "They improve air and water quality, reduce and treat stormwater, store carbon, counter the effects of climate change, help conserve energy, increase property values, provide wildlife habitat and recreational opportunities, and make our city a healthier place to live."

The management plan will be written by the Davey Resource Group under a state contract and with funding from the U.S.D.A. Forest Service. The final draft will be completed in August 2010 and will go through a public review process.

The survey is available through Thursday, July 1, 2010 at:
http://www.surveymonkey.com/s/Anchorage_Forest_Land . The survey can also be found at the Alaska Division of Forestry, Community Forestry Program's website <http://forestry.alaska.gov/community/news.htm>

END

The following is a complete list of comments received from respondents to the online survey. Comments are listed by survey question.

Questions 1: Gender

No comment option.

Question 2: Age Group

No comment option.

Question 3: Please select the community where you live.

Other (please specify).

All the places you've listed are in Anchorage.

Bear Valley
Big Lake (2 responses)
Bird Creek
California (2 responses)
Fairbanks (5 responses)
Formerly of Anchorage will return soon
Hillside (2 responses)
Homer (2 responses)
Indian
MatSu
Nome
Now CT, just moved from Anchorage
Palmer (4 responses)
Palmer, work in Anchorage
Peters Creek
Private Property Twenty Mile Residential Lot
Seward (2 responses)
Valley
Wasilla (2 responses)
We live in Anchorage and have a family homestead (cabin) at the back of Eagle River Valley
Whittier, but former long-time Anchorage resident who used municipal forest lands often.
Work in Anchorage, live in Homer.

Question 4: Please select the activities you enjoy in Anchorage's forestlands. (Choose all that apply)

Other (please specify).

All activities

Appreciating the beauty and tranquility of Russian Jack Springs Park. Please do not develop the area bordered by Northern Lights and DeBarr (on the north and south) and Boniface Parkway and Pine (on the east and west). Thank you.
Archery
Art activities: landscape painting
ATV use
Back country skiing (3 responses)
Backcountry ski touring
Backpacking (2 responses)
Bear Safety Patrol
Being quiet
Boating...not in this area
Climbing, orienteering

Cross country running

Cross country skiing

Cutting firewood (2 responses)

Dining al fresco at a scenic site, watching sunsets year round

Dog walking

Downhill skiing

Equestrian (2 responses)

Escaping the rat race

FarNorth Bicentennial Park trails for daily runs

Firearms practice

Firewood cutting/gathering when possible

Flower study/ Native plant study

Formerly, running

Frisbee golf

General natural scenery

Geocaching (3 responses)

Horseback riding (6 responses)

Horseback riding occasionally

Horseback riding, running, skijoring

Hunting dog training

I don't know what ORV is

I enjoy knowing that it is here, knowing that other creatures are using the space.

I enjoy that the woodlands are there, independently of my activities within them. I enjoy them as a source of ecologic diversity, carbon capture and noise abatement.

I live near the UAA woods and walk along the trails back and forth to my job -- so -- the woods provide my commute route!

I work in the woods

Ice Climbing

Is it mandatory that I do something in the forest?

Jogging (5 responses)

Just enjoying the flora and fauna, in winter and summer. The forestlands add to my quality of life and have made Anchorage a tolerable place to live for 32 years.

Just in case I don't get the chance later. It seems unfair that ORV is the only checked box that isn't spelled out. I like ATV's but wish there was places that include OR"V" VEHICLES full sized trucks (not ATV's) for example.

Just like to look at the trees and the animals that the forest shelter; used to mush dogs before I got too old

Kayaking (3 responses)

Kayaking on creeks and rivers

Kids playing

Listening to nature

Maintaining my mental health through activities which place me outside the man-made landscape...i.e. natural areas, forests. I go there to do all the activities listed above, plus, please understand the objective is not always to DO anything, but sometimes, just to BE in the forest. thank you.

Meditation and btw, I don't know what ORV stands for

Mountain biking, snowshoeing, orienteering

My home has been in the forest for 48 years and during that period I have done a great many of the activities.

My solitude. Not having other Anchorage people around me which is why I selected this area to live.

Nature writing

None

Nordic Walking (2 responses)

Orienteering (6 responses)

Orienteering looking at the forested land from my home at a higher elevation

Orienteering racing which is navigating through untouched forests with map and compass

Orienteering , geocaching

Orienteering, hunting as a family, access to wood (construction, firewood, and Christmas trees). Military training on forested and open lands is important: lands can be shared. Access to Otter Lake, 6 Mile Lake, and Thompson Lake.

Outdoor gatherings such as athletic team meetings.

Paddling, journaling, creating art (sketching, painting).

Picnics

Picnics, cutting Christmas trees.

Pondering political agendas

Provides open space and knowing it's there!

Quiet time (away from motors and other noises

Reading, Picnicking

Relaxing

Rock climbing

Run/jog

Running (26 responses)

Running swimming

Running and Climbing

Running (as in training for marathon) - both paved and dirt trails

Running on trails in forestlands

Running trails (3 responses)

running, backpacking, mountaineering, snowshoeing

Running, meditating

Running, Orienteering

Running, pure forest enjoyment and quiet

Running, rafting

Running, rock climbing

Running, Skiing

Running. Occasional rollerblading. Sledding. Picnicking. Ice skating (city parks/Goose Lake). Christmas tree harvest and firewood cutting (private forest land).

Scenic drives (2 responses)

Scenic views

Scrambling up peaks!

Shooting

Sight-seeing from viewpoints. Escape from urban fatigue. Visit the forest and surroundings with family and friends when they visit (sharing). They are quite amazed at what we have.

Silence

Skijoring (9 responses)

Skijoring with dogs

Skijoring: 1-2 dog(s) pull me while cross-country skiing Orienteering Running Whitewater Kayaking Pack Rafting

Skijoring , enjoying the quiet and natural beauty

Snowshoeing (11 responses)

Snowshoeing in-line skating

Snowshoeing, ice skating (ponds in Bicentennial Park), orienteering

Snowshoeing, back country skiing

Specific nature-wildflower enjoyment

Studying local native flora

Swimming, sitting, picnicking, etc. . .

Taking in and listening to the silence and the sounds of nature.

Teaching bicycle safety to youth teaching Nordic skiing to youth orienteering

Teaching my child about nature

Teaching/ecological education

To take care of environment from fire, disease in trees that could eventually infect the rest of the area

Trail running (12 responses)

Trail running on dirt trails through woods, and running on bike trails through woods
 trail running, skijoring, looking at the trees and plants from season to season, etc.
 Viewing - Entire viewshed is important to me!
 Volunteering at the Alaska botanical gardens - great forests
 What if I don't do any of these things? Is our liberal assembly going to pass a law REQUIRING me to do one or more? Jeez.
 What is "ORV"
 What is orv???
 Why do you have 2 choices that involve dogs and zero choices that involve kids? We enjoy teaching kids about nature and the outdoors.
 Wild Plant Gathering, Spiritual Connection/Ceremony
 Wildflower viewing
 Winter biking
 Yoga, meditation

Question 5: Anchorage's forests provide many benefits and services that support the quality of life in our communities. Please rate the value of the following services to you.

Other (please specify).

Anchor soil and provide wind break
 Appreciation of natural environment and peace
 Areas of peace and quiet for tending the soul!
 Buffering incompatible land uses (i.e., commercial/industrial from residential/recreational areas) (noise, air pollution, unsightly views, etc.)
 Buffers traffic noise
 Calming high winds and providing shade for adjacent areas
 Clean water
 Connection with a local, natural place
 Control runoff and help eliminate flooding
 Diffuse noise and create privacy screen.
 Don't infringe on private property rights. Most of the land in the study area is private.
 Easy access to recreational lands
 Education about the environment
 Education and interpretation of nature
 Enjoy them for their own sake, beauty, peace, solitude, etc.
 Erosion control, soil enhancing, far-reaching consequences if they were diminished.
 Firewood
 Flood prevention
 Forested areas close to schools for education
 Forests provide a range of ecosystem services such as pollution recycling, carbon sequestration, biodiversity storage, etc.
 Forests uncrowded, quiet, peaceful, safe
 General positive quality of life due to aesthetics of forest; buffer from sound and noise; access to wooded areas for recreation
 Getting away from city noise
 Healthful human environment, mentally, physically, environmentally
 Health
 Health - stress relief and reconnecting with nature
 health, safety, and general welfare of the people
 I don't live in Anchorage for asphalt, macadam, and concrete.
 I live in woodland park and am concerned about the removal of trees to build homes that fill the entire lot
 Improve neighborhoods is important improve retail is not

Improve retail areas? what does that mean. There are no forests in retail areas. Hope it stays that way. Neighborhoods should always have a place to explore. Our children should not have to play in the streets because our building codes require precious little natural forest.

Improve the mental health of the general population.

Improved physical and mental health.

Improves mental health by reducing stress

Increase quality of life -- forests and trails make living here better

Insect; wood frog habitat

Intact forest helps prevent climate change

It seems like the prewording for this question is setting up the respondent to answer in a certain way? Do you think it's more appropriate to simply ask the request "Please rate the value of the following services to you:" I'm very interested in preserving these lands.

Jobs

Just to have green spaces, not all pavement and cement

Keeps the city temperatures cooler in summer

Legacy for our children

Less lawn to mow.

Maintain large areas of undeveloped natural areas as much as possible

Maintaining wildlife corridors and open space links to backlands

Makes the area seem less urban.

Mental health booster!

Mental health management---studies show as very important

Mental Sanity

Minimizing noise

Natural Settings - respite from artificial

Natural space within city limits

Nature is my church

Noise abatement

Noise abatement, shade in summer

Noise and visual buffers

Noise buffer

Noise control

Open space within our community

Opportunities for Outdoor Education of youth

Overall ecosystem health; Contribution to climate regulation; Prevention of erosion; Wild edibles; the rare sense of living in an intact ecosystem

Overall health benefits by using the forests

Overall, increases quality of life in and around Anchorage.

Peace of mind

Personal health and fitness from being able to walk/ hike daily in close proximity to home

Personal well being and mental health

Plant preservation and conservation

Plant life habitat - a live energy system itself! I'm speaking up for the trees themselves. the Trees."

Preserve natural habitat

Pride in the care taken by the Muni of our shrinking forests.

Pristine habitat for wildlife

Privacy

Privacy, quietness

Provide an area to be physically active and improve health and quality of life.

provide appropriate noise and visual buffers from city

provide protected areas

Provide restful homes for the homeless.

Provides areas for exercise and physical activity

Provides undeveloped open space, also provides stormwater retention and aquifer recharge

Psychological well-being. The forest also creates a sense of more space in a crowded city.

Quality of Life (3 responses)

Quality of Life, access to quiet spaces

Quiet - sound barrier

Quiet Enjoyment of PRIVATE PROPERTY FREEDOM

Quiet space

Quiet space where man made areas are not allowed

Quiet time away from city noises.

Quieter than any other area.

Quieting

Ready access to slice of wilderness / escape from city

Recreation

Recreation if it doesn't involve loss of forest.

Recreation without noise

Reduce CO₂, carbon sequestration

Reflection, respite from city

Safety on trails from fast bicyclists

Saving the wilds for our future generations

Screening noise/dust off gravel roads

Shade and cooling

Shelter/buffer from noise of traffic; cool places when it is hot

Soil conservation/soil quality and erosion control

Solitude

Some control of city growth/sprawl

Sound control

Sound dampening

Spiritual (2 responses)

Stress management, general quality of life

The forests around anchorage contribute to the quality of life in my community - they are a part of the reason I live here.

There is intrinsic value to forests. In the urban areas of Anchorage Bowl, downtown Eagle River and downtown Girdwood, we should have a no-net-loss of forests policy. In this age of climate change, it is important to replace forests lands removed even for worthy development projects like trails.

Trail access into natural areas

Trail system

Tranquility; noise buffer

Trees absorb CO₂, reducing global warming rates. Forested areas remain snow-covered longer, altering microclimate in favor of native species.

Trees to help Climate Stabilize (Climate benefit)

Very important for sustaining or increasing soil quality

Water quality from runoff

We need to take care of what we have

Well water quality

Wetlands preservation

Wild edible and medicinal plants, spiritual connection

Wilderness areas are important for positive mental health and stress reduction just by viewing a natural scene

Wind Buffering and Erosion Control, Meditation

Wind protection

Question 6: Management and maintenance of any resource requires community support.

Please tell us how you view the value of the following public services and amenities.

No comment option.

Question 7: Like forests everywhere, Anchorage's forests face multiple threats to health, safety, and sustainability. Please rate your concern for the following threats:

Other (please specify).

Access

Alaska Smokejumper

Allowing bears to threaten human's use of municipal forests

Apathy **(2 responses)**

As a Muni we have the control to influence all of the above, except climate change, which worries me yes, but it is something globally we are going to have to flow with while doing our own little bite to reduce our "footprint."

Car fans want roads in every green space

Clear-cutting on hillside for residential development leading to watershed problems

Clearing underbrush seriously diminishes wildlife habitat

Concentrated human use, trampling

Concern that available funds are not prioritized well.

Concerned about ongoing threats of piecemeal removal of tracts for sports fields and development in general.

Conversion to non biologically diverse forms of recreation, like ball fields. Creation of ball fields is great, but should reclaim damaged land, not take biologically diverse natural forests.

Conversion to other uses - e.g. ball parks

Destruction of wildlife habitat and threats to wildlife

Developed and "informal" trails

Development of parks, rather than leaving park land as natural resource areas

Development of perceived no-value open space.

Difficulty of hybridizing new species;

Disregard for Portage Valley Community Council Views

Do not want any encroachment on forests by development

Do not want the forests removed as a means to prevent homeless camps

Encroachment of public into private lands

Enforce no burn nor cutting live trees in forests

Erosion, by policy, our parklands.

Extinction of bears and wildlife due to over management and development

Forests are our primary source of silence and solace

Harm to one of the most important virtues of Anchorage

Homeless camps **(2 responses)**

Homeless camps and lack of safety

Homeless camps, thinning for "security reasons"

Homeless camps; vandalism

Homeless individuals in the parks

Homeless population polluting and causing fire and damage to forest

Human vandalism and also beavers in particular locations

I think that a lot of our forests have been thinned to keep out the threat of homeless posing a threat to the safety of the neighborhoods

Ignorant politicians and developers

Improper use of current funds to manage lands

Inappropriate uses of forest lands, e.g., homeless camps, unauthorized dumping, degraded habitats from high levels of public use

Increased bear encounters

Ignorance, lack of respect, and neglect

Lack of certain types of trails

Lack of clear-cutting removes needed fire breaks and causes extensive wildfires

Lack of individual care, involvement in forests (Last Child in Woods)

Lack of input from marginalized communities on environmental issues

Lack of understanding by the public of benefits and values.

Largest threat is mismanagement of allotted funds

Loss of access, fences restricting wildlife movement

Moose and bears need to be protected and allowed to roam.

Motorized recreation destroying the lands

Need more planting of trees in Anchorage

New roads are the greatest threat!

NIMBY's restricting access

Our city does not do enough to require planted open space or natural vegetative areas for new development.

The city is very one sided, pro development and they don't pay enough attention to the value of natural vegetation to prevent erosion and keep waterways clean.

Overmanagement; "improvements" beyond trail erosion control.

Overuse by people and (especially) dogs, beaver damage

People using public lands as though they are their own, illegal removal of plants and

People using public lands to perform illegal activities, such as drug manufacture and establishing a home.

PLEASE DO NOT EVEN CONSIDER REMOVAL FOR OTHER USES!!!

Poorly planned use

Preservation of natural habitat and wildlife

Pressure to change or lockup land for use by an elite group without consideration for the public at large.

Pressures from increased use (recreation)

Proliferation of homeless camps

Public misuse and neglect: vandalism, litter, ORV damage

PUT A TAX ON SKI'S AND BICYCLE'S

Roads and apathy by the public, illegal camping, crime and lack of respect for it as a public domain

Specifically removal from natural area to sports fields or traded off to development in exchange for less contiguous tracts of "undeveloped" lands

Street people are a threat to our urban forests. They pollute, set fires, vandalize, spread garbage.

Subdivision and road encroachment

The trend to change Quiet Use forest areas to cleared areas for organized sports fields and the associated traffic, parking, congestion and noise areas. Kincaid park will never again be a quiet place to trail walk now that the mass soccer field complex has gone in. Tragic.

This goes to question #6, but there was no comment space for that question. As for Sports Fields, I think they are important, but I don't want to see more of them cut up Far North Bicentennial Park or Kincaid Park. Instead of clearing more park land for more sports fields; better care should be devoted to the ones we already have throughout the Anchorage Bowl.

Threats to ridge top construction and tower development

Too much space being developed (ball, soccer, etc.)

Trails built further into natural habitat of wildlife

trapping

Unbalanced Board of Game goes against biologists suggestions (e.g., allows hunting of wolverines in this area)

Uncertainty of long-term parkland use by Muni of non Muni-owned lands at the airport (Little Campbell Lake, Connors Lake/Bog (north half) and Spenard Beach Park

Un-mandated bear proof garbage bins

Unsustainable transportation effects including destruction for roads that impair non vehicle, human powered and mass transit options and destroy ecosystems and air quality

Using forest for economic development including low density housing

Vandals building fires above our homes at Mile-Hi Pass, also throwing Molotov Cocktails against the rock wall at the Brownie Dr/Barclay switchback

We've allowed developers to dictate the quality of our environment, if we are running out of room why are we allowing lots to be cleared so one story strip malls can be built?

Wildfire is natural but hard to manage in urbanized areas.

Wildland wildfire is a huge concern here in Stuckagain Hts.

Question 8 – 15 See Stakeholder Sentiment – Public Survey (Chapter 2)

No comment option.

Question 16: Managing forest lands requires funding for trails, fire protection, hazard tree removal, restoration, and other maintenance measures. Please rate your support of the following options to fund forest management and restoration.

Other (please specify).

A "park" pass similar to the State of AK. I have no problem paying to use the trailheads and have access to the forest/trails.

A campaign to support and protect wildlife and habitat for wildlife in the Anchorage Municipality.

A capped sales tax should be implemented in Anchorage to offset city expenses similar to the Mat-Su Valley. Property owners should not be required to foot the bill, renters and tourists should share the burden by contributing through a sales tax.

A local carbon tax on gasoline, heating fuel of all kinds (including firewood), etc. philosophically would be the best thing for supporting forests and parks.

A portion of tourist revenues such as a half dollar from bed tax, or from tour companies (Magic Bus, 907, etc.), suppliers of tourist entertainment (experience theater, bear and raven, aurora, etc.). ____ Tourists definitely benefit from our forest/parkland ____

Acquisition of federal, state and other foundation grants

Add a \$5-10 option on Perm Fund application to support and require \$1 for hotel stays, cruises, and other visitor type accommodations.

Adopt a forest/tree program

Allocation of funds from current MOA revenues.

Anchorage forest lands - and park lands - should not be developed. Period.

Anchorage residents will experience more and more user density problems as more and more easily accessible land becomes developed. In the 15 years that I have lived in my home 95% of the off-leash dog walking area has been developed or the military is reducing access. This is becoming a problem for me, and is leading me to research moving to another city to accommodate my needs.

Annual parking pass similar to the State Park annual parking pass.

Any sort of tax - maybe a head tax. I'd much rather pay taxes for this than roads.

Anyone that feels like donating to keep our wildlife habitat can do so through a set up entity.

Charge a heavy fee to any property owner removing forest trees.

City wide park pass for all park facilities, including trails, do not segregate out trails.

Class B and C wetlands can retain forests in part and should be given resource protection as greenspace during development projects by commercial interests.

Consider green infrastructure ideas

Consider user fees for bicyclists, bird watchers, joggers, photographers so they are contributing their fair share.

Corporate sponsors, selling naming right to companies for portions of forest land, adopt a tree tract, trail, sell right to log dead dying trees for firewood, lease commercial operations at trail heads etc

Could there be a donation collection box at trailheads and parking areas? Similar to a parking pay station, but just with a sign soliciting contributions to the park?

Cut services. Our country is in an economic crisis. Many people are losing their jobs. Some people are giving more of their income to help others who cannot afford to survive. It is time to cut the taxes for property owners, seek more volunteers to perform trail maintenance, and, increase the fees to those who use the forests and services that the property owners are paying for.

Depending on size of development, I would consider set asides for public use and access

Develop a partnership with State Parks and federal programs that deal with trails and conservation.

Develop and support mass transit, and non-automobile-centric transportation. Emphasize environmentally sustainable transportation. Cut down on road construction and bonds. Make the ones that are funded about more than cars.

Donations not only to the Parks Foundation, but to all other forest- and park- related agencies and non-profits

which are not funded by the Parks Foundation, including the Alaska Botanical Garden, State Parks, Friends of Campbell Creek Science Center, etc.

Explore other sources of state and federal funds in support of forest management and restoration

Fee to sports teams that use the ball fields in Bicentennial or in other cleared areas. If there's a trail pin, there should be a sports fee too. And what about pavilion use in the sports field area?

Fees for Frisbee golf

Fees for ORV, fishing supplies, skis, mountain bikes, similar to wildlife conservation funds.

Fines for dog and horse waste---or trail pin for bringing animals---or designate part of animal licensing fee for waste removal costs. A "sin" tax on vanity lawn products i.e.: weed and feed, fertilizers, etc. that runoff into watersheds and wildlife corridors--and on vanity fences (people don't want moose eating their ornamentals) that interrupt wildlife corridors.

Fines on those who destroy the forests that go back to forest preservation

Firewood cutting permit if carefully managed

Fundraising concerts or activities and events

General Fund Cost to MOA

Get money when someone knocks over a tree to replace it.... fine people who cut down trees that weren't theirs to begin with. Shoot people who take birch bark off living trees -- okay.. just kidding, but FINE them. Get people in the pocketbook for not putting nature first!

Get the community out and get a take care of areas like the highway trash pickup.

Given the lack of maintenance funds for public spaces, and private landscaping that often gets destroyed by snowplows and not watering, how about giving incentives to preserving as much existing birch forest and understory as much as possible - except perhaps at urban gateway locations. Beautifying landscaping is great as an accent in key focal points in the community where it can be maintained.

Grants, taxes, user fees, etc.

HEAVY taxes on snow machines, 4-wheelers or any motorized equipment/vehicle that enters the forest lands for any reason. Forfeiture of all equipment and lifetime ban to anyone who violates rules.

How many surveys do we need. Anchorage wants the forests, wildlife, trails, clean air and water. Our forests give us this. Builders keep as many trees AS POSSIBLE is a joke because it's just not possible (cheaper) to keep them. Look to the high end ghetto housing known as Prom. Pt. They said they would keep as many trees as possible too. Development pours money into the city we won't see impact fees until a poorly engineered site landslides. We can't even keep people from encroaching on park land - no enforcement.

How much is this going to cost? A trail pin? really? Maybe the MOA isn't the entity to orchestrate the management. They can barely afford to take care of the municipal parks, and most of them have roads right next to them.

I do not know what is meant by "Trail pin."

I do not want to see the forest lands developed beyond hiking / skiing trails.

I don't know what "trail pin" is. I am not in favor of manufacture of goods in exchange for donations.

I don't know what a "trail pin" is, as referred to in the question above. More property taxes. Do a better job of "PR" - regularly reporting via "good news stories" to the public -then when you ask for more money you have the support that has been built over time of what "good" has regularly come out of funds spent - less likely to get scary cuts, more likely to get support and increase.

I don't know what a trail pin is...

I don't support high usage fees, municipal park fees, b/c of development of parks by outside contractors. They should not be a money making proposition. They should be monetarily accessible for everyone.

I have for many years advocated that we need a universal trail/ track pin that members of all users groups and unaffiliated park/trail users be encouraged to purchase rather than just having the ski trail pin.

I have lived in different states that imposed a \$1 to \$5 fee on vehicle registration to support wildland management. Is there a non-profit associated with the area that can help fund raise additional funds or organize volunteer efforts - a Friends of Anchorage Forests or something?

I support a policy that minimizes non-essential "improvements" such as paving for trails (dirt is fine), For funding I suggest you seek part of the funding that goes to the State when someone purchases a State Parks parking pass, rather than impose additional costs on folks that use trails. As indicated in the survey, using rails is not the only value of forests/trees. I also suggest that you seek to minimize costs by seeking volunteers (boy/girl scouts, school groups, conservation groups, fire stations, arbor) to contribute labor and local businesses to

contribute materials (e.g., tree removal services, SBS, etc) . I also suggest you coordinate with others who manage trees such as MLandP and Chugach so that you ensure consistent policies and don't duplicate efforts.

I think it has to be a combination of all of these. I also think that we need to diversify our tax structure in Anchorage so that property owners do not take the burden of the responsibility. Our forest lands make Anchorage what it is. Without proper management of these lands and a commitment from the administration of our city, we are in danger of having developers and people after the almighty dollar come in and destroy what makes this a beautiful place. We have already experienced this in our 20 years in the community--there will be more and more pressure to push roads through forest lands and build low density housing in our forest (just look at the Hillside) if there is not proper management. We need to get a mindset in this community that we don't all need acres of land around us and 6000 sq foot houses to live in, that we can exist in high density homes and all can enjoy the beauty of Anchorage. Planners need to be at the table as well as transportation (including mass transit) to assure that the developers, are mindful of the totality of the quality of life and not just look at immediate economic gains.

I think nominal trail head parking fees are appropriate

I think we could use students in natural resource management, interns from some of the local nonprofits, and youth to help manage our forests and parks without requiring so much capital outlay.

I would like there to be a connect between healthy forests and salmon-streams, and the need for bears to have their corridors through forests (hillside rover's run, for example), to be closed during salmon season. Muni needs to work better with BLM on this.

I would not support levying fees from developers because I do not support development of forested land; however, if the city permits development of forested land I support a very high tax on developers.

I would not want funds to be used for development of parks as in the recent FNNP Trails Plan or First Tee plan or ball fields, etc. Funds should be for forestland/wildlife protection and for enforcement.

I would pay more than \$10/year additional in my property taxes

I wouldn't mind paying \$10/year with my property taxes; but I wouldn't be in favor of paying a mill rate like for schools. Plus, people who do not own property would not have to pay which is not really fair.

I'd be happy to have it added to property taxes. This is an important component in the quality of life in Anchorage. I don't really think it would be fair/good to try to get hikers/walkers to pay a fee. Also it would be hard to come up with a good fee structure for development. Development should not be the only income source for forest management.

If a sales tax is established for Anchorage then a small portion of it could be used to support forest conservation and management

Impact fees for developers are good but we don't have the backbone to require them. The idea of requiring natural open space or planted open space is also good but our muni officials back away and the building lobby owns most of the assembly. We need more trails, the coastal trail extension and bike lanes. We don't need to spend big bucks on Firewise again. We need to limit the amount of older trees felled and when they are cut they understand the diverse nature of the forest in that trees support one another against wind and when we cut them grasses take over increasing fire danger in the short term. We also need to require standards against clear-cutting especially on the hillside where flooding and erosion are problems for neighbors down slope, especially for large non-residential building projects.

INCOME TAX

Increase the volunteer opportunities for maintenance and "adoption" of sports fields. The soccer association might adopt some fields or baseball or softball. Increase the dog parks and the owners will pay. I know they would

Increased state and creation of city fuel road taxes to directly fund the protection of wildlands and wildlife that the roads directly affect.

Invasive and non-native species management and control

Is the first item an oxymoron? Developers in forests?! No to developers removing any forest. Period. End of story!

It is important to continue to educate the public about just how the forests affect our lives, so that more support managing them---otherwise folks think that just those who "use" the parks should pay, i.e. user fees. In connection with the park foundation, perhaps a "forest fair" along the lines of that in Cooper Landing, celebrating and high-lighting what the forests bring to us, along with some fund-raising events, such as a biker race, runner's race, forest walk for families. I know it would take a lot of organizing, but it could have great

benefits and folks are always looking for something to do with the family during the summer vacation, and there could even be skiing races in the winter, with entry fees----in cooperation with any clubs already actively using the forest areas.

It is long past time to institute a sales tax (goods and services only, and capped)

It is not necessary to develop grandiose costly plans. We don't need 30 municipal employees sitting in an office. Do the basics. Keep the trash picked up.

It's very apparent that the city does not know how to manage the forest. Trees that have fallen in the forest just rot.

Just leave the wooded areas alone. This does not require as much funding as you want. "Natural" means left alone. There is minimal cost to that.

Maintenance of park lands and trails needs to be a normal part of the city operating budget and for bonds, under road and drainage bonds as it is infrastructure also.

make all parking areas fee areas

Make sure marginalized communities are included through outreach and innovative collaborating with activist like me.

More funding from State government. I would rather see the State spending money on this than something like funding a lobbyist to sit in D.C. and try to get the Arctic Refuge opened to drilling, for example.

More than \$10/year on property taxes

Municipal budget. I pay \$4K of taxes per year with half going to schools I don't use - anymore. Go through the political process and make this stand up to that scrutiny.

Need more information on Cost to developers since they will pass on the cost to the consumer. The land owners in this town already pay a huge portion of fees that benefit everyone. I would like to see all of anchorage residents "pitch in."

No special treatment or development to specific user groups. The parks are a source of beauty, inspiration and wildlife habitat that is so unique to Anchorage. Overdeveloping such as more bike trails, lights, and unplanned access would be detrimental. Many major cities are now trying to establish a greener footprint one that Anchorage has not lost yet

Obtain or dedicate a portion of Anchorage bed tax to park and forest mgmt.

ORV user fees and trail parking fees

ORV users pay who impact trails more, summer damage. Timber purchase fees for collecting firewood, Christmas trees. Volunteer organizations do physical work to reduce costs to taxpayer.... timber clearing.

Other (please specify)

Other taxes such as sales tax or gasoline tax, so that not only property owners are taxed

Parking fees (2 responses)

Parking pass, like the Chugach State Park has

Parking permit sticker for parking at municipal forest lands and park lands.

Per use fees; annual pass;

Permanent Fund click pick give

Permanent Fund donation option for forest maintenance.

Prohibit speculative hydro-axing of vacant land. I have neighbors with new houses in the \$600+ price range whose lots are nothing but pavement, grass, dandelions and alder. It is ridiculous to allow a developer to routinely install granite countertops, heated driveways, etc., but not to require the builder to preserve some of the native vegetation on a 20,000+ building lot. We also have to stop taking raw public land for sprawling public buildings, sport complexes, etc. Infill development (i.e. using underutilized developed land) instead of land grabs should be required. Otherwise Anchorage is 100% dependent on Chugach SP and NF (with a little help from the BLM Campbell Tract) for natural forested open space. Military lands cannot be counted upon to stay this way.

Public volunteer opportunities to be part of work crews doing projects

Purified air tax \$10/annually

PUT A USER TAX ON BICYCLE'S AND SKI'S JUST LIKE THEY DO ON MOTORCYCLE'S AND SNOWMACHINES

Real Estate Transfer Tax

Reallocation from road development funds into forest management funds.

Recycling fee for cans and plastic and glass containers at point of sale.

Responsibility rests with the citizen resident with less reliance upon government intervention or directives

Sale of firewood from harvesting spruce beetle killed trees.

Sales tax (2 responses)

Sales tax for MOA!

Sales tax in Anchorage

Sales tax or other tax.

Sales tax, tapping PFD, increased user fees, increase vehicle registration costs.

SALES TAX. This is the only tax that would also encourage tourists to support maintenance of the resources that we share with them every summer, and force ALL users--not just Anchorage homeowners--to support a common resource.

Sports and other special purpose facility fees except for Kincaid and Russian Jack Parks for existing facilities

State appropriation

Strict Requirements for Green Areas in multi-unit developments. Larger lot sizes with green area set asides for development of private lands on the periphery of the city. Requirements for public forest/park access in developments. I would like to see a formal city/borough statement requiring city parkland be set aside per each X thousand people in voting district. The more green area the city has per person, the more pleasant the life is for each person in the city.

Supervised programs in which private citizens could assist manage such as weed pulling parties or beaver trapping etc.

Tax increment district may be least impact on citizens.

Tax on retail outlets selling lawn and garden supplies - similar to hotel bed tax

Tax or charge race fees for organized trail user groups (such as the Nordic Ski Association, and bike and running organizations) who hold racing events on municipal trails. Events with hundreds of participants such as these cause trail erosion and undue damage to the public trail system.

The "Forest" is within Community Councils. What's their take on it. Isn't this survey jumping their gun so to speak? Isn't that politically purposeful? What does Portage Valley Community Council think?

The forests in our parklands HAVE to be actively managed. It does not take more than 3 years for the growth of cottonweed and other brush, trees, etc. to cause a real hazard in our Parks, from both 2 and 4 footed predators, as well as increased fire danger. I am appalled that Mayor Sullivan has chosen to turn back more than 20 years of pro-active yearly management of the forested areas of our parks. The former PandR programs of "Clean and Green," had great community support, and is essential to keeping our neighborhoods fire resistive and safe for both people, nature and animals. Talking only about "hazard tree removal" is BS; that is not wood-lot management that is the worst kind of miss-management. I will do everything in my power to see that Mayor Sullivan's short sighted, ignorant and misguided new ban on doing any kind of real woodlot maintenance in our parks will be changed.

The ongoing firewise education and woodlot have encouraged people to do lots of work on their own.

The tranquility of our forest lands is needed by so many in Anchorage. I would support any way that would help keep our forest lands safe.

There are lots of volunteers willing to help manage the forest lands in their neighborhoods without throwing additional taxes, etc. at the general population!

This appears to be a tax proposal. The MOA is a Municipality, not a forest not a preserve, This is a Municipality to be developed for people not forests, beasts or birds.

Time and general donations

Too many municipal taxes fall on Anchorage property owners. Renters don't pay property taxes, Valley and Peninsula residence don't pay Anchorage taxes, yet are constantly here "using Anchorage", shopping, eating out, recreating, etc.

Trail pin is a good idea. Would suggest to integrate into existing trail pin concept through Nordic Ski Association of Anchorage, just to avoid double dipping. But could also market differently to reach a broader group of users.

Trail running/biking/orienteering/ events to benefit forests

Trailhead Parking Fees

Use fees/card carrying for yearly fee

User fees

User Fees and rental fees from commercial activities (concessions)

User fees for group activities

User fees for parking in parks.

User fees for the forested public lands. You want it, you pay for it.

User fees in defined recreational areas

User fees such as ball fields and even dog parks.

User fees to tax those who use the forest land who are not property owners..including nonresident tourists

Utilize community volunteers and professionals. User fees for parking at trail heads and donations from the public that are requested/marketed to specific user groups. Public recognition of community forest supporters/sponsors may encourage more financial support and other involvement.

Visitor tax

Visitor Tax, Tax on strip malls.

Volunteer days for trail work, rain gardens, etc.

Volunteer forest keepers group

Volunteer organizations to learn about and help maintain a healthy forest.

Volunteer programs for some of those things, i.e., trail maintenance, brush thinning, cleanup. If the muni had a paid volunteer coordinator, but the bulk of the work was done for free by volunteers it would not dramatically increase the muni's financial obligation and it would help get more people involved in the community and in making a difference in the world they live in.

Volunteer time, manual labor or activity.

Volunteers , Graduate forestry student, user groups, high school athlete involvement at lower cost- not more high paid bureaucrats sitting in chairs taking public money. Conservation organizations doing voluntary tree planting: hunting groups, ORV and ski organizations etc. High school skiers and other trail users being allowed to cut, maintain trails with their parents, not high paid workers. Boy Scout group involvement in projects.

Walking/jogging paths are important to me for health issues. Unfortunately parks attract vagrants and criminal elements also. So I avoid isolated paths and areas of dense growth. Thinning the trees in the parks would add security.

What is a Trail pin? (2 responses)

What is a trail pin? It doesn't look like any questions really pertain to my specific desired use. I'm not a save the trees guy if you live in the city accept city life. If you want the forest move to the Valley or something. Some trees in the city are good but don't spend my money to return the city to a forest it's not going to happen!

What is trail pin? Funding volunteer programs can garner more bang for the buck. Just as we have Master Watershed Stewards, we can have Master Forest Stewards and recruit people to work as need on their own time. With enough materials and management support, we can leverage relatively small investments into a healthier forest system.

Whatever it takes to preserve our forests and add trees to any landscaping project.

While "Landscape" clearing is appropriate near trails the fire departments programs to remove all dead fuel is not necessarily the best approach to forest maintenance. Because money is available is not a reason to proceed with extensive thinning or clearing.

Working with legislators for state funding too

Would be willing to volunteer for organized restoration and maintenance efforts.

Would need details of the expenditures and what funding would support for the trail pin and Park Foundation options.... a detailed mission of each objective and exactly how donations would be spent. Use the Anchorage Youth Employment in Parks program more and increase the capacity of the program and student labor on trail and forestry projects throughout the Muni. Spend more money and pay better wages for youth crew leaders with good leadership skills to really engage a youth crew and get good labor from them.

Question 17: Please use this space for any additional comments or concerns you have about this process?

"Last Child in the Woods", the Nature Deficit Disorder, has defined the absolute necessity of urban forests to (re-)introduce all of the redeeming and essential qualities of forest to growth, recreation, examination, and physical activity for America's children. In addition to preserving and maintaining our forests we must expand efforts to encourage every child to experience and embrace the "woods."

"You don't know what you have until it's gone"

#12-Nature can manage itself, i marked "disagree" because "management" by humans is required when other humans are threatening the forest therefore management is required. #16-needed to explain these funding options better. In general, good survey, good cause. Many "leading" questions though leaning toward those

who feel that "management" means preservation, which is fine by me however it suggests a bias in your survey. Also, it is likely that only those who give a crap about the forests will fill out this survey and likely not the developers which throws another bias into the survey. In short, there a lot of details not included in this survey that gives it little weight as far as public opinion.

(Don't need a question mark here! It's a statement) I've lived here for 30+ years and one of the things about Anchorage that I noted and loved first were its enormous tracts of undeveloped land scattered about the city. I hope that the muni will do what it can to preserve these natural breaks in the skyline. They're hard to reclaim, as most cities will attest. Keep Alaska, and Anchorage, wild! I'm "wild about wild Anchorage." People do not travel to Anchorage for work and pleasure because it's a city. They travel here to see a place that has a wild edge to it, something a bit raw. A place that insinuates upon us regardless of who we might be, an egalitarian wilderness. The trees around my house, spruce and hemlock, are 350-400 years old. They've been around since before Captain Cook, for heaven's sake. We should appreciate and support our trees. Biologically, we need them, they don't need us.

1). Place a moratorium or future trail development in forest lands. 2). Focus on maintenance of existing trails. 3). Do not allow organized trail user groups to preclude the general public from the use of any existing trails or forested areas remaining in the Anchorage forest lands.

12. The forest could manage itself if human development and mismanagement did not damage it so much.

A key to getting support is educating the public about the role of the forest in our quality of life.

Access to trails and parkland need to be guaranteed when developers make new residential areas out of forested areas.

Additional paved and unpaved trails through our forests will encourage more people to spend time in them.

All forests in this area are not the same. A survey this general is little more than useless.

Anchorage has a lot of forested areas and is certainly not lacking. The questions certainly seem tilted toward conservation and little else.

Anchorage is unique; I LOVE seeing not only mountains but also moose on my walk through the woods to work. Thanks for asking!

Anchorage without trees would be dismal - for residents and visitors (not to mention, moose and other wildlife and fish!).

Anchorage's forests are continually being chopped up and becoming smaller. They are very important to the quality of lives of those that live here. As they are diminished and turned into roads, parking lots, buildings, etc. it destroys a big part of what makes this a desirable place to live. The trees and forests need to be preserved before they are lost.

Another threat I see to Municipally-owned forested land is the desire for the airport to acquire certain parcels for their development purposes. For example, Heritage Land Bank land and Pt. Woronzof Park west of the north/south runway have been targeted in airport planning documents for acquisition and development.

Appreciate the opportunity to express opinions via this medium

As a professional public opinion pollster I regret to tell you that the results of this survey are completely invalid. This survey has been designed to lead respondents to responses desired by the party commissioning the poll. Impartial professional surveys DO NOT provide "push" narrative as this one does. I will be alerting the Mayor's office and the Assembly to unbiased nature of the poll.

balancing the use by residents with preservation is the goal. getting residents into the forests without ruining them in the process needs to be managed. creating some access for youths to the forests through lower impact activities like Frisbee golf might generate some appreciation and respect for the benefits that forests provide humans.

Based on the questions, I'm not sure what the point of this survey is. While I value the forest, I support development INTO the forests to people like me can access them without having to pack in or bike in on some trail for non-motor use. I'd support RESPONSIBLE development of lands within the forest(s) as part of an access/appreciation effort. Including parks for camping (RV and tents), and a route from Eagle River to Girdwood through that 26 mile valley that links the two on the topo map used to illustrate your survey site. That route would open up forest to folks who would not normally see it. Fees from camping, RV access would generate revenue needed to manage the lands and promote its appreciation. Harvesting of dead wood (spruce beetle kill) and other forest fire hazards would also improve the health of the system, and create jobs for forestry workers charged with the implementation of a wildfire hazard remediation program. This, in my opinion, would offer more bang for the buck than any public safety (education) effort aimed at telling residents how to protect the

forest.

Beetle kill and live tree thinning needs to be done with safety foremost and aesthetics secondary. Much of the MOA thinning has been a waste of money by not removing enough of the trees. Thinned areas are usually left in an overcrowded dangerous state with tree canopies still touching each other. It will do nothing to lessen the fire danger or severity of the burn. If there is a catastrophic fire I will blame the MOA.

Clear-cutting/complete tree removal of areas for construction of buildings is not necessary. We should look towards retaining as much of our natural environment as possible.

Comment on 11: Often the trees preserved on a construction site are impacted by compacted soil or additional soil on roots. Nobel efforts to save trees are for naught when trees die slowly; sometimes it's best to clear and add plant material back on a newly graded lot.

Developers should be mandated to retain a public ROW or other access through developments that would otherwise block public access to public lands. We are rapidly being limited to a few select access points to muni lands, (as well as state park lands) and this will require planning and zoning to specifically address this loss.

Developers should pay an enormous fine for cutting down trees. One area - Goldenvue, I believe, was supposed to have 90% of the trees maintained. They appear to be all gone. We did a bird count there one year and there were no birds as there were no trees. That cannot happen again!

Developers should save healthy trees whenever possible. Nature is able to manage forest lands fine, if we aren't bothered by forest fires.

Development and old stand forests are mutually exclusive. Development must happen for the city to grow, saving old trees can only be done if the land contour does not need to be changed to facilitate drainage or landscaping. New trees and vegetation should be included in all new development but not to the point that safety is compromised, i.e. visibility for street access, and hiding places for nefarious culprits.

Development costs are already extremely high and onerous in the Anchorage area. There needs to be a balance between the beautification requirements, prevention and reforestation requirements and development.

Did MOA reinstate it's urban forester position? Without a trained professional on staff MOA cannot rely on the SOA DNR for forest management on city lands. Seems salary and benefit increases for the Firefighters union could have been reduced to provide for an urban forester position. It's all about priorities and political pressure.

Enough development!!!

Firewise was too expensive. They cleared too much in some areas, not much over site. We need incentives to encourage large lots and open spaces in development and trails.

Follow up to question 12 on last page (management of forests) - I do believe that nature can manage its own forests, but I believe people need to manage the non-natural threats (development, careless use of the resource, etc.).

For me, this is THE most important issue affecting Anchorage quality of life. Higher on the scale than public safety, education or transportation.

Forest are an extremely important part of Anchorage. I use our forests (bicentennial and Russian Jack) on an almost daily basis as do many other people. They help with our community health, our individual health and are critical in a time when environmental stresses are increases and people's health are decreasing. There are only positives about our forests and they should be kept intact and protected for the future of Anchorage.

forests in Anchorage are the primary contributing factor to a higher level of quality in our family's life.

Funding should also be set aside for the management of new conservation lands added to the city's lands. I have heard that the city is reluctant to accept donations of new conservation lands because there are limited funds available to manage them. It is critical to preserve as much land as possible now while we can while it is still undeveloped.

Further explanation is needed to make a decision in support or not to support these things.

Good process which needs to be done. As development in Anchorage has gradually "filled in" the previously undeveloped forested areas, the city has in some areas become less attractive. It will take conscious effort and some money to manage what's left and to generally improve community aesthetics and access to forested areas. Great that you're doing this. Without hard data (needs/interests survey) everything is anecdotal and without much value re funding acquisition, live warm bodies volunteering, etc.

Green space provided by forests represents all the best in our quality of life in Anchorage.

Healthy forests are vital to the welfare of Anchorage residents whether they spend time in them or not. Our air quality, water quality, and recreational opportunities--all critical to our collective health--depend significantly on the integrity of our forest lands. I see protecting forests as an important public purpose and encourage the MOA

to be good stewards now and in the future.

Healthy forests help protect the health of trees on private lands.

Higher density housing with significant amounts of shared quality green space, both "groomed" and more wild, is much more valuable to me than a suburban sprawl of small fenced yards. I choose to live in a condo development next to a green belt for this reason. Anchorage has a world class resource in its green spaces and trail systems. My visitors from back east are in awe of what we have just outside of our doors - no driving required. They also are impressed with the number of trail users they have seen, and with the fitness level of those users. Our trails and shared outdoors spaces do matter to our health and our quality of life. They matter a lot.

Hopefully the MOA, State, Feds would never consider selling any of their park land/forests for development of housing or businesses.

I agree that forests should be managed but believe that, as for other natural resources, it usually depends upon managing people to avoid impacts from development, recreation, and other uses. I recommend a strong collaboration with State Parks to develop coordinated approaches and priorities for taking care of Anchorage's forests. I look forward to hearing about other opportunities for involvement in the planning process. Thanks

I am concerned about managing fire danger and removing dead trees and cutting fire breaks should be considered.

I am concerned that taking this survey at a time when wildfires are prevalent will negatively impact public perception of forests. The forests are a crucial part of our community. They increase sense of space and well-being.

I am for responsible development but they are beginning to scare our beautiful green belts and parks.

I am frightened that I will lose my home on the Hillside when poor management of the aquifer results in wells failing and the need to put sewer and water onto the Hillside. The cost will drive us out of our homes. AWWU said that \$1,000 per front foot is cost and my lot is 304' square. I am retired and cannot afford \$300,000 to put sewer and water to my home.

I am happy that dead trees have been removed, and for all the trails which i know about. just discovered the one by Rabbit Creek--very nice--what a rich a close resource.

I am interested in "Active Living Environments" meaning, making Anchorage's urban areas safe, pleasant, and green areas to walk and bike for recreation and transportation.

I am not in favor of decreasing forested areas for the purposes of home/business development.

I am not sure as to what level of management we should move to. Ideal fire prevention would be a groomed forest like in Germany and that is not natural. Natural, diverse, wildlife enhancing forests are messy with natural diseases and insects and may not be conducive to easy hiking and walking.

I am not sure what a trail pin is?

I am very concerned about the future of additional "green" areas in Anchorage. I believe that every developer should be required to include these areas when they push neighborhoods into areas. They should also be required to leave healthy natural vegetation and not be allowed to bring in non-native shrubbery/trees. In addition, developers should meet with road officials and school district officials on the impact their developments will have. I realize some of this is a separate issue to forested land, but it remains a long-time pet peeve of mine.

I am very concerned about the loss of our forest areas in Anchorage due to development and road construction. The University Lake area has been a real jewel. The current "improvement of the trail" (as of 6/2010) has significantly altered the environment of the trail in, my opinion, a very negative way. Also the new extension road at Tudor and Bragraw makes no sense to me what so ever. It has really torn into the forest and impacted the "usability" of the area for recreation all for a relatively , small insignificant road.

I am very concerned about the wrong kind of development. Especially like what is going on in Eagle River. I don't think we need to overdevelop for tourism. We need to respect the properties near the forests and make sure that they are not overly impacted by parking lots and tourism. We do not need to develop for tourism but develop for an aesthetic place where people live and recreate. Keep it as "natural" as possible. If people need to struggle a little to recreate that's fine. We do not need big buildings and facilities. Diminutive, esthetic construction would be good.

I am wondering if a survey of randomly selected respondents is being done to obtain more representative results.

I believe healthy forests of native vegetation are extremely important to any community. Any management that

needs to be done to keep those forests healthy should be included in a plan.

I believe protecting our open spaces and forested areas in Anchorage is very important for a number of reasons. Many of the benefits are not measureable -- for instance, the improved emotional well-being of residents and those with limited access to the outdoors is significant. Erasing wild spaces and forests makes Anchorage less livable and beautiful, plus it turns Anchorage into yet another ugly concreted and overdeveloped American city. We need open space. And we need to ensure it is not destroyed by a "death of a thousand nibbles," whittled away for power line and utility easements, ball fields, roads, and other urban "improvements."

I believe that one of Anchorage's greatest assets is forest lands and parks. too many of our young people do not get a chance to enjoy the outdoors....that must change!

I did not understand what you mean by question 12, and I tried not to answer it but your survey won't let me. This will probably give you results that you don't intend. I get really tired of people complaining about their property taxes in Anchorage. If you look at cities of comparable size, we pay almost nothing. If you factor in the permanent fund dividend, we pay nothing. We want to build build build and then complain when we have to pay taxes to operate and maintain what we asked to be built. Part of the problem is the system we have where we separate capital costs from maintenance and operation costs. It should all be laid out in one funding request. That way people might get the clue that what we build will cost us into the future to operate and maintain. It is too disconnected now. The forests, trails and green spaces in and around Anchorage are really what makes it worth living here. I can drive 15 minutes and be in the woods or walk 5 minutes and be on a trail along a creek. I look out of my office window at the Chugach range. I am so lucky. I could be looking out at the next high rise or the traffic going by. Studies have shown that green spaces have a positive impact on the mental health of children. If you are not aware of the book "Last Child in the Woods" by Louv, you should read it. It summarizes the studies that have been done.

I don't know what a trail pin is or what a donation to a park foundation is. Is that a volunteer contribution or a required one? and by who?

I don't think that a trail pin or donations necessarily distribute the costs equitably to everyone benefiting from the forests. When we move to Seattle in 1.5 yr, I am going to miss the amazing greenspace and forest resource that Anchorage offers.

I don't think the questions on this survey were written from an objective point of view. conclusions seem preordained.

I don't trust the MOA's ability to manage much. The Mayor has exhibited a real dearth of leadership on a number of issues. And, who's to say the forest ends at the border of national and state lands. I think some really creative thinking is in order. Maybe identify the highest risk area and do something really great there to get people motivated and supportive.

I feel strongly that Anchorage's forests are under attack on many fronts. It is very important to build a strong plan to protect them and keep them as whole as possible.

I find some of your questions unclear. Examples: Question 12 - What is meant by "management"? Preservation and restoration are very different from manipulation and domestication.* Question 16 - Does support of donations mean I would donate or just that I'm OK with people making donations? (*Regarding management, my view is that it's not so much that the FORESTS need managing, it's that the HUMAN IMPACT on the forests needs managing.)

I find your survey to be more about funding and recreation rather than sustaining existing forest lands and determining impact on the health, safety, and general welfare of the populace. I visited the Forest Web site and tried to better educate myself prior to participation in this survey.

I hate having to pick which city service I support while sacrificing others. Yes, public safety is important but parks, trails and libraries improve our quality of life and I'm willing to make an investment to improve these services in our community (and yes, will pay higher taxes for them).

I have been in Alaska since 1963. I come here mainly cause I wanted to be where Nature was mostly untouched and not developed by mankind. I am old, but I still love my walks in the wilderness around Anchorage area and beyond. It comforts me to look across the Cook Inlet and up in the Chugach Mtns and know that there are not developers carving up this beautiful land we call the Last Frontier. On land this state is the last frontier. I want young folks of the future to have a place to at least come to and enjoy knowing that there are some people that don't need to tear down Mother Nature's works to advance their own greedy ideas. Maintain what we have is a job in itself, we don't really need to progress to the point of the South. 48, Take care of what we have, please...enhance it by sensible conservation and sustained yield of our wildlife, unlike how we have managed

Kincaid Park(a disaster in wise use at this point).

I have been shocked at how developers are free to remove all natural vegetation from the land before building (mostly ugly boxes). We need more codes to ensure attractive development that integrates well with Alaska. That will keep the tourist coming and increase property values the only people who gain with the present way of doing things are the developers. I was downtown on Sunday and noticed how we could have been in any city anywhere, there are very few developments that are not generic to the rest of the country/world. We are losing our identity. Better landscaping would go a long way to correct this.

I have long wished to be very rich. I would then buy all the forested lots for sale and allow them to just BE. Forested areas are critical to human health - mental, spiritual, physical and emotional - not to mention important to the non-human species we share this land with!

I have seen fire protection and hazard tree removal taken to extremes, destroying the forests that were supposed to be protected. Property owners should protect their own; if they are afraid of forest fires, they shouldn't live next to forests. Trees should be allowed to be hazards and only cleared from blocking a trail when they fall across it. No poisons should be used. Forests knit the ground together, so ripping it causes erosion and degradation of the land and water. Whenever possible, it should be left intact and unaltered.

I hope this is being coordinated with the planning department and with new Title 21

I hope your budget allows defensive social science, e.g. economics surveys, that might help convince our Assembly not to bend to the will of the development community on fees and site-plan requirements.

I just returned from Vancouver BC where Stanley Park is the crown jewel of their city. Be smart! Growth at this latitude is very very slow. Loose it and it's gone for a generation. Give it over to developers, and it's gone forever.

I live in Anchorage because of the beauty, quality of life, wildlife and the trails. I use them on a daily basis. I live on Chester Creek trail and walk, bike and ski on a regular basis. This is why I live here.

I live with the Chester Creek Greenbelt right behind my townhome. I specifically moved to this place 7 years ago because of the proximity to the Greenbelt and to the trail, etc.. I have a wealth of birds, including some uncommon and rare birds that frequent this Greenbelt, especially in the summer. I love the Anchorage forests and think that MOA as well as Anchorage citizens have a responsibility to manage them wisely. Thanks. Aleta Pillick, 2039 Cliffside Drive, Anchorage 99501

I only hope that the plan does not find its way to the bookcase never to be looked at again. I also hope that it is a strong plan that Municipality leaders chose to support instead of fight.

I support this process and encourage you to do more. Feel free to contact me. Sincerely, Hugh Brown III - 907-884-9968

I think it would be more helpful to have a detailed map showing the areas you mean. The term forest is confusing and especially when you're excluding state, federal and private lands. Is a forest "wild" or just any urban tree? Was I answering questions about parks (public municipal lands) so something different- I couldn't really tell.

I think more trails in the forest lands will equal more idiots getting attacked by bears. While I do think that, my other frustration is the number of jerks on the narrow roads (biking, skate-skiing(?) and other). What is the Coastal Trail for? I know I can't have it both ways.

I think roads and schools are important, but I feel that their importance is often placed above that of having open spaces and wooded areas for people (kids, adults, families) to use.

I think that preserving the multi use idea is VERY important. I personally see the bike crowd grow more intolerant every day. When we are hiking or jogging, they come swooping down on us and are very impatient. My horse friends take lots of abuse from bikers.

I think the map showing the forest was hard to understand. It didn't appear to have north as up and did not show any roads or cities (eagle river, girdwood) to help identify areas.

I think there could be schools sponsoring local forests so kids get to get that experience and knowledge of the benefits of intact forests, trees, etc.. Good for everyone!!!!

I think your study should attempt to quantify the cost of developing our forests. As we replace forested lands with housing, roads, etc, while these developments have benefits, they also cost the community in terms of services (emergency, sewer, road maintenance, etc, etc.) Intact forests also cost money to manage, but they also provides services you allude to in the survey. Absorbing runoff, providing buffers to traffic noise, carbon sequestration, etc. People don't think of the negative externalities associated with traditional community development, nor do they appreciate the positive externalities associated with healthy forest land....good luck

getting our community to think beyond next year's dividend check -- hey there is an idea -- get municipal forest land management on the possible voluntary dedicated funding options for a dividend donation check off via the park foundation.

I value Anchorage's forestland for peace, restoration and rejuvenation of my psyche. I recreate in the forests of Anchorage at least 3 times a week, because getting out into nature is good for the soul. It is beneficial to mental, as well as physical, health and well-being. Please help ensure that the forests of Anchorage will not be forgotten in future development and management plans. Thank you.

I want to preserve our forests and city greenbelts. I am dismayed at the deforesting that takes place in any develop mature trees.ent project, rather than trying to preserve some of the m

I was originally unimpressed by Anchorage, but have fallen in love with it over the past 2 years. It is the forested lands that have made this change for me. A city of this size where I can get off work and be hiking/enjoying nature 5 minutes later is truly remarkable. Anchorage currently has the exact right balance of preservation of nature to development. If we continue to allow new development to encroach upon the forested areas we will lose essential water drainage/animal habitat and lose that part of Anchorage that makes it uniquely Alaskan. We don't want to be just another urban environment like so many other large cities. We have managed to maintain a unique balance between nature and city development and we should do everything possible to preserve that balance. If we don't, we will lose what makes us a beautiful and healthy place to live. Please do not support the urban development of more of our forested lands. Leave these essential habitats intact. We have plenty of land that has been developed already. We have a tendency in Alaska to build out rather than up when we could get more use out of currently developed areas by simply building taller. We can build up on these lands and leave the forests alone.

I would gladly pay additional funds to our property taxes IF the funds would be used to manage forests properly by reducing dead wood and black spruces (to reduce the fuel for forest fires) and to guarantee accessibility for all users (hikers, snow-machiners, 4wheelers etc) Otherwise I would view raising property taxes as a waste of taxpayer funds.

I would like to see forest lands remain as natural as possible. Anchorage's TRULY WILD lands is one of its major attractions to me and one of the characteristics that keeps me in Anchorage (vs. Lower 48). I have not been able to find any other location that has the amenities that Anchorage offers combined with true wilderness, within and around the city. Without this quality, I would relocate to a less extreme climate, closer to my family. But I can't give up my city full of wilderness areas and wildlife residing in their natural habitat.

I would like to see some recommendations for potential municipal ordinances to assist MOA with costs associated with hazard tree removal, and restoration of native forest impacts from development activities that remove native tree canopy, also appropriate ordinances for controlling/mitigating/monitoring/managing non-native species introductions. Past experience has demonstrated that native forest maintenance and/or restoration can't be accomplished by resolution, policy or voluntarily, but by action of law. The forest management plan should attempt to provide costs associated with "no-action" alternatives to emphasize the important (and cost) associated with not following through with the plan recommendations.

I would not support any taxes or fees that went toward any type of development other than trail maintenance. I do not support use of forest lands in Anchorage for road development. I support only recreational use of Alaska forest lands. I would support taxes or fees for other management fees (public safety, fire prevention and control, forest health etc); however, these activities should not be user-dependent. I almost checked the answer that the forest can take care of itself, however, Anchorage is encroaching into forest every year. Part of forest management should include protection of the forests from inappropriate use and development. New and unusual public use of the forests (such as food gathering) should also be addressed, as well as illegal camping.

I would not want funds to be used for development of parks as in the recent FNBP Trails Plan or First Tee plan or ball fields, etc. Funds should be for forestland/wildlife protection and for enforcement.

I would only support a fee system if there were a guarantee that the forest lands would NOT be developed. There is plenty of cleared acreage already for developed parks. I support maintaining WILD forest land within the city limits with minimal human intervention.

I would support the MOA in organizing (funding) and my labor along with other volunteers to help work on ball fields, forest, trails, and other recreational facilities. Users can put back in what they get out of our public lands. I'd like to be able to cut firewood if carefully managed. I do not want to see logging. Anchorage forests are first and foremost important for fish and wildlife, water quality and recreation. No more forests should be cleared for ball fields and parking lots.

If managing forests includes protecting and preserving as much forest land as possible or increasing the amount of natural, relatively or completely undeveloped forest land as possible, then I believe we need to manage the forests. Anchorage's beauty is in its nature, sadly not its human constructions. Nature in the city is a precious jewel, giving us a quality of life worth preserving and fighting for. I choose to live here because of the nature at my back door. It is definitely a quality of life issue.

I'm sorry to see this plan limited to only lands managed by the Municipality. At the very least, other public lands (state, federal) should be included, and we should be inching the public towards accepting regulation of existing forests on private lands.

In the overall scheme of the forests, it's more important to preserve large tracts, intact, than numerous smaller ones, for wildlife and biology reasons. Each tract has a border area where wildlife and ecology are different than in the central portion of the tract. The smaller the tract, the less usable space for wildlife and natural ecology.

Is the term forest adequately described? Does it include a single tree or a grouping of trees? Is the urban forest different from the forest that surround Anchorage, are different management tools needed? What about the differences between MOA Public Works and utility companies who see trees and forests as threats and as not necessary or essential, public support is great and might lead to some day political support, but really there is a need to show that trees save us money and reduce the costs of services rather than increasing the costs. Try and plant a legal street tree in Anchorage, good luck! Anchorage needs a program that encourages street tree planting. Are there short term benefits to tree planting? If a tree lasts for ten years along a roadway, is that a benefit or is it a drain on resources?

It is definitely reasonable and should be required for developers to preserve existing trees whenever possible.

It seems like money could be better spent on trees and perennials vs. annual flowers.

It seems like the forests are fine, so long as we don't cut them all down. I don't really get the whole "management" idea. Admittedly, I don't know much about it, but forest fires seem like a natural and necessary event that don't necessarily need stopped all the time.

I've been in Anchorage 20+ years now, and I'm afraid that development takes place without a good planning process. There's an attempt at public participation, but big developers seem to be able to override the process, and this is eating up our wild spaces and especially our wetlands within the city. It's very important for the city to maintain its wildness as it moves forward or it will lose what makes Anchorage unique. (And as an aside, my personal opinion is that people who think that the parks belong to people and not the bears and moose too, should go back to the lower 48 where the parks don't have bears and moose.)

Just to emphasize some items already brought up in this survey: greenspace and wildlands within the Anchorage Bowl provide critical services such as erosion control and water quality improvement--the loss of which absolutely must be calculated in every development project that impacts these areas if we, as a community, are not going to pay much larger amounts to mitigate these issues in the future. Also, the aesthetic beauty, wildlife habitat, and opportunity for active recreation must not be underestimated when factoring in these areas' contribution to our quality of life, the developmental health of our children and ourselves, and our community's ability to attract cutting edge industries, entrepreneurs, and other dynamic and creative people.

Keep "management" to the minimum necessary to protect the forested places/trees. Keep costs low. Don't "gild the lily" by thinking more bells and whistles is better.

Keep me posted

Keep ORVs and snow machines out of Anchorage area forests !

Keeping native trees in place is important. Intensive mgmt is not needed everywhere. There are a lot of people in anchorage with love and skills to help keep forests healthy, enlist their help.

Leave existing forest areas alone. Restore/add more forested areas where possible. Restrict development to already developed areas within city residential/commercial limits and focus on reforestation around subdivisions and businesses. Less "playing field" space and high maintenance fields, and more wild parkland and undeveloped areas. This is not LA, this is Alaska. People who come here should be considering the benefit of raising families and living in a community that nourishes the environmental aspects of urban proximity and make Anchorage unique, unlike the countless cities throughout the rest of the country.

Limit your manage efforts to the forests on public lands - leave the forests on private lands to the management of the people who spent their hard earned money to own their land.

Make good use of volunteerism! Follow good examples from trail watch, weed warriors, creek cleanup, etc.

Management of our forest land means different things to different people. I think we need a variety of management strategies ranging from minimal management (spruce beetle control) to "parking out" selected

close to development parcels. Forests land that provide riparian cover for Anchorage waters should be maintained in a fairly natural state (minimal management) to help maintain healthy waters- buffer strips should be widen to a minimum of 50' (each side) and enforcement against trespass should be a high priority.

Management of the forests seems to be a nebulous term as often this management ends up resulting in the destruction of the "forest" through overzealous building of park amenity structures, extensive tree clearing (grass and shrubs burn too, just ask States with grassland fires), excessive widening of ski trails, and road building. While some of these services are obviously important, others are minimally so, and even though environmental impact studies are done, any negative impact seems to be regularly overlooked in favor of development or some perceived increased safety factor. Sadly, I and others I know, have reached the point where we rarely approve Park bonds as we do not like most of what the Muni does with the approved money. It is not that we do not want to support the Parks, be we do not support overdevelopment or over management of our forested lands.

Many of us already pay for a trail pin to the Nordic Skiing Assoc. and are thankful for their work on trails (even though they cut trees to build new ones). Another trail pin does not seem like a great idea. Perhaps a Forestry and Flowers pin to support 'beautification' (flowers) and forestry. We also need a program to establish tree-lined streets with ample room and protection to allow them to mature and stay in place for a century rather than building and rebuilding roads every few years and not allowing trees to grow. I have seen a photo of a beautiful tree-line street in Anchorage from years ago...

Minimum if any development - these areas are buffers against industrial noise, community stress and need all the protection we can muster

MOA lands which may be in good shape can abut "tinder box" trees on military bases and/or Chugach State Park lands. If the adjacent "border forest" has a high burn potential they need an active fire threat reduction plan.

More of our forests have to be preserves as natural rather than being "developed"

More public access points are crucial. Better trail maintenance.

My concern is this is some idea of some group (forestry officials ? forestry credentials?) to seek and demonstrate the need for public funding of their "programs" and expertise.

Nature does manage the forests somewhat, and in certain circumstances, I believe we should let it do so. If we develop too much of Anchorage areas forests we'd be just like any other big city. Anch. is unique and we need to keep it that way. I love being able to walk up the road from my house and be in the Park.

Needs of wildlife need to be addressed. Restoration of stream corridors and contiguous greenbelts.

Networking and communications with all related agencies will be key to success - a broad base of collaboration and support is important.

New development needs to pay their entrance - and I'm a developer.

No new taxes. Tax the state employees if you want this.

No questions are asked about the hunting and trapping which are currently allowed (encouraged). This may drive some species like the wolverine to extinction in the Chugach.

Not clear what is meant by "Trail pin" in section 16.

Of all the concerns, my highest concern and priority for an action plan and funding is fire management

One pet peeve is the use of Anchorage green belts as a dumping area by neighboring residents. Forest lands should not be viewed as an area where you can dump your yard waste such as grass clippings and brush. More public education is needed in order to properly steward Anchorage's forest lands and aquatic habitats.

One thing missing here is the idea that we have forested areas in and around Anchorage that do allow for wildlife to exist, but pose a danger to humans. How many people need to be attacked by bears before we actually shoot the bear. No bear hunting is allowed, so the bears procreate and end up on the trails with the humans. If we pay for trails, we should be allowed to use them and the payment for the trails should go to removing the bears from the trails so they can be used. Otherwise, the public should be reimbursed for the money they spent to develop the trail. Nobody goes to the store and purchases something that they do not intend to use. Likewise the public should not be prevented from using something they paid for. Wildlife is an amazing thing, but bears and humans on trails do not mix.

Open/expand more lands to ORV use. Forested lands are unfairly locked up for ORV use, but open for other uses.

Open-Ended Response

Our creeks need natural buffers and buying out private property along creeks and enforcing buffers should be part of a forest management plan. Identifying forest land near school and setting aside and facilitating forests

for Educational uses should be included in the plan.

Our forest land and wet lands should consist of 30% of the Anchorage bowl. All other area should be made available for development. this is Alaska! We are surrounded by wilderness. Hunting of moose, bears, geese, etc. should be allowed in the Anchorage bowl when it needs to be controlled. Our kids should not have to play soccer in a field covered in goose poop! Having loss of life due to a moose or bear in the Anchorage bowl or on our UAA campus is unacceptable.

Our forests, trails and wildlife are extremely important to me and those I know to preserve and protect and are a major part of why I live here. Protection is critical

Our Mayor needs to not advocate taking BIG guns into city parks, for bear protection or any other reason.

Parks and forests in the city should be more conducive to human use and need to be secure.

Parks in urban areas should be made safe for PEOPLE!!! Get rid of the BEARS!!!!

People who have practical as well as scientific knowledge about trees and land management must be involved in this process. If you don't have a person with a high degree of common sense coupled with working knowledge, it greatly increases the chances for costly mistakes

Perhaps professional arborists can mark trees to be removed along bike trails before community work parties remove them. People have gotten a bit carried away with the chainsaws and cut too many trees.

Please address light pollution (lighted ski trails invade the night sky). Please address wildlife corridors and watersheds. Thank you!

Please address public safety issues in our parks. Last week, a man was shot in a local park, individuals were having sex in an open area of another park and two times in a row I saw different individuals going to the bathroom right beside the trail. It makes it a bit hard to enjoy the park!

Please consider a Web site area for the care of the muni's trees. How much to water the crabapples or other muni trees that front residences. I call the arborist, but not everyone knows we have one.

Please consider some law that forbids mass bulldozing of all trees in a new subdivision. Plus, why do they bother planting grass when 2-3 years later it all turns to dandelions. Can't wild grasses, shrubbery, labrador tea, moss, clover be planted? Have the planters of grass contact Verna Pratt for advice.

Please stay out of micro managing private property. That is not the muni's purpose. Manage the forests on city property and stay the hell out of everyone else's business.

Please use this space for any additional comments or concerns you have about this process?

POINT OF SALE TAX ON SKI'S AND BICYCLE'S THEY USE ALL THE TRAILS FREE AND THEY NEED TO HELP PAY. LOOK AT THE THOUSANDS OF MILE'S OF BIKE TRAILS WE HAVE THAT THE BICYCLE RIDERS AND SKIER'S HAVE TO USE AND THEY SHOULD PAY TO MAINTAIN THEM.

Pretty quick turnaround !

Property owners are being taxed to death in the Municipality of Anchorage. The current administration doesn't seem to care enough about taking care of its property owners.

Property owners who build in fire prone areas should be responsible for the protection on their own homes and property. Wildfire is a risk homeowners accept by building in areas susceptible to wild fire. The Municipality SHOULD NOT be considered responsible for the protection of all properties in fire prone areas, thus incurring expensive management costs.

Public lands should be kept wild and safe for recreational users to enjoy nature. To me, safety includes restrictions on hunting/trapping and recreational vehicle usage.

Q.12and13: not sure what's subsumed in the concept of "managing" forests. If protecting them for habitat/esthetics/recreation, then I support management.

Question #16: What is a "trail pin?"

Question 11 asks whether developers should preserve trees "whenever possible." In principle, I agree. But in terms of a requirement, I am leery of an absolute requirement "whenever possible" because it is impossible to tell how such a rule would be applied: for forbid development or limit development to what can be done without cutting any trees, or are we just talking about providing incentives or encouragement to leave trees where reasonably practical? I would be concerned about strict requirements, but think encouragement would be great.

Re: Q #12: The PEOPLE need to be managed so that their damage to Anchorage forests might be minimized. really there are plenty of trees around anchorage. you should try living in Tokyo or Beijing anyway have fun with all this

Residential and commercial developers should not be allowed to completely remove existing vegetation. The

trees and shrubs they put in afterwards often look unhealthy and always represent less biomass than if they had worked around existing features of the site.

Same as the comments in 16 above. Do a better job of "PR" - regularly reporting via "good news stories" to the public - then when you ask for more money you have the support that has been built over time of what "good" has regularly come out of funds spent - less likely to get scary cuts, more likely to get support and funds increased.

Seems like the scale for answers should have a "somewhat important" before the "not important." Anchorage's forested parks; particularly FNB, CSP and greenbelts; are very important to my family and our lifestyle. They are the reason we enjoy living here.

Seriously have concerns about Parks Director Dillon. Don't really appreciate some of his priorities and lost faith in him when I heard he designed the pond area for the home on the coastal trail that trespassed on park land. He should have been fired. The million dollar pavilion is another waste. Nice job but way too costly. Parks and Rec director should be a hired position, not a political appointment.

Since this is an optional, non-random survey, I'm not sure how useful it will be.

Somehow people should be educated about the value of undeveloped forest land. Some people see forests as land simply waiting to be developed into something "useful."

South Fork Falls off River Park Drive in Eagle River is little known by visitors and citizens. However, it is just like Katmai except it's a 15 minute drive from Anchorage. I've lived here 11 years and see the bears all the time... tonight, another bear and cub just walking through. Salmon stack up in the river below the falls which brings the bears every summer. If developed, it would pay for everything. Unlike Katmai, it has no wooden walkways to protect visitors, few signs, no facilities, no rangers monitoring during active visitor hours, and worst of all, inadequate rules to control bear interest in human habitat (i.e. like Katmai-bag fish, control garbage, etc.). I have had to yell across my yard at people w/kids walking on road that a mother brown bear w/cubs is 20 feet away from them behind bushes... I've had to pick people up in my car to avoid the bears. People just don't know the amount of bear activity we have here. It's wonderful, but needs greater management. Please consider.

Spend my tax money on something I can use. Not something that's going to be preserved. Save the trees outside the city don't raise my taxes to pay for "Forests." Why hinder development (in this economy) by increasing development fees.

Summary statistics of slanted sound bite survey questions on personal values regarding forestry is not going to be persuasive to intelligent decision makers. Do your homework and provide real science based facts please. Survey might be too informational for those who fear being educated...;-)

Take this survey to the trail heads at all forested parks - bicentennial, Kincaid, Russian Jack, etc. and to forested areas around schools that are used for recreation. We need an accurate count of users and their uses.

Thank you for doing this

Thank you for this survey.

Thank you for conducting this survey. I feel most fortunate to live alongside Russian Jack Springs Park and to walk in the woods daily.

Thank you! **(2 responses)**

Thank you< I'm glad the Muni is on top of this!

Thanks for asking. Participation and education are key to an effective democracy.

Thanks for doing this survey.

Thanks for doing this.

Thanks, but you really need to include more questions about programs such as clean and Green to keep our parks safe and beautiful.

The \$10 a year for property taxes would need to be explained as to where this money would go.

The citizens of Anchorage are so blessed to have the Bicentennial Park and the people that manage it. Over development in any form will slowly erode this into a resource that we will never regain. Here is an area that has salmon, bears, moose, lynx, fox, coyote, a wolf or two etc.. all this will be lost and its ability to bring wealth to our community both in education and inspiration if we let special users overrun it or overdevelop it.

The citizens of Anchorage need the forests. They add beauty and interest to our city. They provide habitat for our birds and wildlife. The forests provide peaceful, beautiful areas for people to spend time in. They are little pieces of "the real Alaska": the trees, the streams, the salmon, shrubs, mosses, wild flowers, mushrooms, birds. We are happier for having nature surround us with its beauty. The alternative is looking out our windows at asphalt streets and parking lots, traffic, crowded housing, industrial buildings with very little green, and of course there is

then a lot of exhaust from cars and buildings to breathe. It is very short sighted to completely clear away the forests. Ball fields for forest park lands is a very bad exchange. Far more people can take enjoyment from a forest than from a ball field. And forests clean our air on top of that!

The forested areas within the Municipality of Anchorage are a unique and valuable resource to the city's residents. I appreciate the energy being invested into their management and encourage the city to actively manage and preserve these forests for the long-term well-being of the city. Thank you

The idea that May Day Trees should be removed from all of Anchorage's lands, as I have heard the MOA Forest agency is saying should be done, is ridiculous and idiotic! Yes, Anchorage has some beautiful trees that are natural to this area but May Day Trees grow quickly and look grand plus give off a beautiful scent. Not many of our natural trees can have that said about them.

The intro to this survey suggested it was about forests on municipal owned land. How would developer fees be linked to this? I actually would support developer fees, but how could it be done equitably? Others have already cut down trees on private property; how would you impose a fee on those who waited to develop?

The management of our trees / forests goes right to what type of city we want to live in. We've let the developers dictate the quality of our city with terrible results. The efforts so far to manage this have had little to no impact. As said previously, if we are running out of space why are we allowing developers to strip empty lots or build one story strip malls? We need limits on box stores, parking lots and landscaping requirements for commercial and residential developments.

The many forested areas around Anchorage are a part of what makes it so wonderful and beautiful. I hate it when I see another forested area torn down to build another housing development that we don't need.

The natural habitat is why we are living here in AK. Destroy it and destroy the beauty of our state.

The outcome of this survey must consider more than just what is best for the forest aspect. Some of the questions seem loaded to generate an answer that does not consider the greater good but pushes for an unobtainable goal of preservation rather than wise use of our lands and resources

The Parks and Recreation Department SORELY NEEDS an increased maintenance workforce and even more parks and trail patrol rangers that interact with the public and offer bear education tips to decrease the potential for maulings.

The question about valuing community services is silly. Flowers should not be compared to human services - they have entirely different scales of resource needs. I would guess that most people value all of the items listed (safety, roads, schools, etc) to varying degrees and the question implies that you must pick between them all. Silly. If it was phrased to ask about flowers vs. trails vs. info signs vs. recycling bins in parks, the attempt to prioritize "resource" use would have worked, but not its misleading and silly.

The rate at which Anchorage's trees and forested areas have been removed during the ten years I have lived here is infuriating. I feel that every development, road, drainage, etc project needs to be SERIOUSLY examined for the amount of woodland and the number of trees that will be removed or affected by the project. For example, MLK drive and the Dowling extension have a FAR too large a footprint. Further, development adjacent to our trail system should be ESPECIALLY examined. For example the trail from Goose Lake to UAA used to be a beautiful wooded area, with the clearing for the UAA buildings and the power line it is now an urban area with trees. The trail along Northern Lights East of Goose Lake is now barely separated from the road in many locations - this makes it FAR LESS pleasant, not to mention more dangerous for the chances of dogs and kids to run into the road. PLEASE SAVE OUR ANCHORAGE WOODLANDS

The reason I marked "I'm not sure" on question #12 is that it's a gray area question. There are some processes, such as invasive species, WUI areas/fuel loads, or native vegetation restoration is areas of disturbance, that definitely warrant active management on the part of the Municipality. However, many of the other natural processes can function well if left alone.

The survey is great and greatly needed. Improvements could elicit people's preferences and trade-offs. For example: you could find out how people feel about developing forest into retail space or whether they feel like it's much more worth to keep forests and parks the way they are. For example, choice experiments can put a dollar value to the value people associate or would be willing to pay to keep the forests a certain way. Ultimately, you would be able to estimate what's called the non-market value of the forest and park land. Analyzing people's preferences and how they would trade off between different uses is critical for future policy development. Your survey is a great first start but could be improved upon with more advanced methods such as the one described above. Good luck and congratulations on taking this on. It's hugely important and somewhat overdue.

The value of an intact forest ecosystem is so important in terms of climate change, and ecosystem services such as water quality through watershed quality, quality of life, attraction to tourists and the recreational needs of the state and Municipality.

There is no mention as to figuring out how often people use the forests, or how widely distributed this survey is. How about tourists and getting survey information from them too? Also, there is lots of plant gathering done in the forests, esp. by the local Asian population - that can be a very significant activity that I am concerned may not be captured.

These types of surveys leave much to be desired in terms of categorizing things so simplistically. There are many things I may support once I know the details and justification but would not support without constraints, restrictions, limitations etc. Additionally, while I may agree the Muni has responsibility to manage its lands the degree of responsibility and the level of management are very open to debate and discussion. Regardless nothing is as black and white as the surveys implies and I hope the results are not portrayed as such.

This is a very poorly written survey. It is obvious the conclusion which is desired by the those who prepared it. This survey needs to be rewritten with a more unbiased point-of-view.

This is good survey. User friendly. I am forwarding the like to friends and family. Thank you for providing it on this important topic!

This is one of the best city forests I have seen. As a professional forester I feel we should manage these lands for community and wildlife benefits. Active management will be needed to maintain a healthy ecosystem. this may generate some firewood for public consumption.

This survey is a push poll. This appears to be a survey to achieve a predetermined outcome. Most of the land in the study area is private title, and the use of that property should be determined by the owners within reasonable zoning and code limitations. Otherwise we don't really own our property, do we. The public forest components should be the limitation of the study. Alaska has tremendous amounts of government land and very little private title land (less than 1%). Don't micromanage the little bit in private ownership. Also, the muni has done a horrible job under the Begich administration of managing the wildfire risk, spending millions of dollars with virtually no result. Most of the unmanaged beetle kill is on parkland. Private owners have generally cleaned up their fire risk and it is the city properties that pose most of the unmitigated risk. We are having a very dry spring and lots of wildfires are raging across the state.

This survey will not yield statistically valid results because the sample design allows anyone to fill out the survey, which could lead to biased results. A random sample would have given you more robust results.

Too much of the development I've been seeing that encroaches on the Bicentennial Park has an enormous footprint. Why is SO much forest land needed for each facility?

Trees and forest are essential to the quality of life, besides protection of water and air, they provide far more to humans in terms of beauty, recreation and sense of space. It is not in our make-up to be surrounded by concrete, metal and asphalt. Trees have value simply for being there to create comfort. Look at any high end real estate and homes of the wealthy, anywhere in the world. They all have trees. In Anchorage we are wealthy with trees and forest, so we take them for granted. Places without trees, are spending vast sums to plant. We are blessed to have trees around our home.

TREES ARE VERY, VERY IMPORTANT TO QUALITY OF LIFE IN ANCHORAGE. ANCHORAGE'S NATURAL BEAUTY IS WHY I CAME, AND WHY I STAY. TREES AND FORESTLAND NEED OUR PROTECTION.

Two comments: I am opposed to the extravagant (in my opinion) projects that whittle away at the urban forests. For example, the work that is being done on the trail that parallels N. lights. and then turns south toward ANMC/APU. The expansiveness of the tree removal, width and depth of the new trail is huge for a bike trail. I hate to see such a huge amount of money being spent to "upgrade" the trail. If this was done on a smaller scale then there would be more monies available for more maintenance and other projects. Upgrades seem to mean more pavement, less trees and the loss of the natural feel that these trails have. Why is this? To accommodate large equipment? Seems like the "improvements" are removing the very thing that folks like about our trails. They do not all have to be as wide as a road nor do huge trails need to cover them. The swath cut to connect from N. Lights more or less to Tudor, removed so many trees and often the new trail parallels an existing trail. People want to be in the woods not on a road. There are plenty of those options already. Secondly, I do not think we should develop any more of our urban parks and forests for additional sports fields. I think we should be utilizing the school facilities as much as possible year round before new developments are considered. which also are publicly own. Thank you for giving me the chance to voice my concerns.

Unusually simplistic questions with little room to vary. How many people are against air quality? But would folks

support active burning - better question than the former. This seems geared to the kind of statement that says "....over 95% of those responding favor good air quality." Non sequitur. How representative is this? What metric is used to validate any of these responses? Why is Eagle River not considered in Anchorage? Wildfire management activity?

Very unscientific method for doing a survey. Concerned about skewed results from user groups that are better organized than the general public.

We are losing forested land in Anchorage at a high rate. It is one of the reasons I want to live here. MOA forested land is very necessary to preserve some of it.

We are so blessed to have so much forested land within the MOA. One of my big concerns is that these wild areas not be allowed to be defiled by homeless camps. The presence of these "squatters" makes those of us senior citizens who use the trails and wild areas, feel uneasy and worried about safety.

We enjoy living in Anchorage due to the forests, wildlife and proximity to hiking trails. We value nature and would like to see minimal impact on this land. Thank you!

We live in a very unique place. It hasn't been overdeveloped, yet, and the wildlife surrounding us is unmatched in any other large city in the country. It is crucial we protect and treat what we have well.

We need more small, intimate trails, not such large, developed trails. Horse users need to pitch in on trail construction and maintenance, as their use degrades trails the most.

We need much higher penalties for clearing without a plan, cutting unnecessary trees when developing, and better screening and parking lot/box store landscaping.

We need to stop building and enhancing trails. We need to go to the basics and maintain what we have. Most of the trails in Anchorage are unused, miles of them.

We need to teach respect for private property rights within Anchorage. Public recreation interests do not trump private property rights.

We strongly value our forest lands--for wildlife habitat and as our primary source of water.

What is this about? I hope you are not trying to feel out support for developing our precious forest lands.

While I don't like the idea of requiring developers to save trees except in certain specific areas--impractical--there could be incentives offered. Recent clearing in my neighborhood (Atwood Estates) has increased south winds considerably on my property. Wildfire is a huge concern throughout Anc and especially the Hillside and ER. Wholesale clearing of land for ease of development results in developments ugly to the eye and often changes watershed behavior to the detriment of people and wildlife around and below the area cleared (e.g. Prominence Pointe). Developers should be required to set aside a fund for environmental renewal (NOT domestic-style landscaping) similar to the 1% for art programs) and severely fined for any violation or denied development approval for a specified period e.g. 5 years following any proven incident.

Why is the state of Alaska involved in policy and management planning of Municipality of Anchorage forest lands?

Wild spaces and recreation in them is very important to the sanity of humans as a whole.

Without the local forests we are just another big noisy city, with the mature forests we have a quick getaway which gives quality to our lives.

Your questions are slanted.

Your survey will likely produced skewed results, as it has been sent to people on the Community Sustainability List for Alaska. Most of us love forests and place their importance higher than do many of those we are surrounded by. You should also invite people from groups such as the Anchorage Baptist Temple/Church (Prevo's group) so as to get a reflection from a different type. You might find they provide answers that would be informative.